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**Identifying Structural Models
of B2B Procurement Exchanges**

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¹ Business to Business Electronic Commerce: Challenges and Solutions, Merrill Warkentin (Editor), Idea Group Publishing, 2001.

Identifying Structural Models of B2B Procurement Exchanges

EXECUTIVE SUMMARY

The emerging environment of e-business has introduced a new organizational form: the Business-to-Business (B2B) procurement exchange, which is a networked organizational form that is centered in virtual space but has physical supply chains and a technology platform with associated services, allowing it to act as an interorganizational intermediary that enables enterprises to conduct online transactions. Procurement has moved increasingly to an electronic form, and there has been a surge in B2B exchange organizations that promised significant value creation from e-procurement. However, recent observations point out that many exchange organizations have failed to provide the anticipated value. This study examines the role of B2B procurement exchange in interorganizational electronic commerce toward understanding how they can effectively create procurement value.

Section 1 presents a classification scheme for B2B exchanges, describes several examples of today's online exchange organizations, and discusses its implications for today's interorganizational buyer-supplier relationships. This section proposes a classification scheme for B2B procurement exchanges that attempts to capture the complexity of today's online B2B procurement relationships. The proposed typology encompasses neutral exchanges, including public and private exchanges, and the concept of biased exchanges - monopolies and monopsonies. This section also discusses several implications for interorganizational procurement by incorporating product, organizational, and market characteristics and consortium exchanges. Section 1 proposes several guidelines for appropriate selection of B2B procurement exchange organizations.

Section 2 proposes a comprehensive business process model for procurement B2B exchanges, describes a set of IT-enabled services around procurement, and applies this model toward answering several design questions for B2B exchange organizations. Based on six interpretive case studies with procurement B2B exchange organizations, we present several new findings and

propose a set of fifteen new insights for the role of B2B exchanges on e-procurement. Section 2 concludes by discussing the implications of this study for acquisition theory and practice, recommending solutions to improve the procurement process and suggesting future research directions.

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SECTION 1

A Classification Scheme for B2B Procurement Exchanges and Implications for Interorganizational e-commerce

ABSTRACT

The Internet is transforming and reshaping the nature of interorganizational commerce by enabling many new types of business-to-business (B2B) electronic procurement exchanges. A B2B procurement exchange is defined as a new organizational form residing in digital space that acts as an interorganizational intermediary that enables organizations to conduct and engage in any-to-any online procurement relationships. This section proposes a classification scheme for B2B procurement exchanges that attempts to capture the chaos and complexity of today's online B2B procurement relationships. This typology integrates several theories of interorganizational relationships from the information systems, marketing, and organizational economics literatures to propose a parsimonious but comprehensive taxonomy. This typology encompasses neutral exchanges, including public (many-to-many) and private exchanges (few-to-few), and also the concept of biased exchanges, monopolies (few-to-many) and monopsonies (many-to-few). This section discusses the implications of the proposed taxonomy for interorganizational e-commerce that ensue from the alternative types of B2B procurement exchanges. Furthermore, the influence of product, organizational, and market characteristics and consortium exchanges on B2B e-commerce is discussed. Finally, we propose several guidelines for appropriate selection of exchange type and particular B2B procurement exchanges.

INTRODUCTION

Intense competition in electronic markets and the growing number of web-based B2B marketplaces have made interorganizational e-commerce important and challenging. The notion of B2B e-commerce is not new, but its scale and scope has proliferated with the advent of B2B procurement exchanges, which provide a facilitating structure for virtual relationships by enabling an easier identification and selection of suppliers and productsⁱ, lower transaction costs, and more integrated supply-chain management compared to traditional channels (Dai and Kauffman 2000). With over 1,000 currently established Internet B2B exchanges and an expected online transaction volume of over \$6 trillion by 2004 (Bermudex et al. 2000), a primary issue associated with research on B2B procurement exchanges is their proper classification (Kaplan and Sawney 2000). Most B2B exchanges have substantially different characteristics in terms of their industry and product focus, the type of relationships and power asymmetries between buyers and suppliersⁱⁱ, and type of product sourcing (Nelson 2000). The complexity of B2B exchanges calls for a complete but parsimonious typology that can bring order to the chaotic space of B2B e-commerce. Before being able to make some systematic efforts to capture today's chaotic B2B environment and build new theories, an academic-oriented classification scheme should be introduced to link the existing literature into the new landscape. Hence, the primary purpose of this section is to establish a comprehensive and versatile typology to capture and explain the scope of today's B2B exchanges, illustrated by existing real-life examples.

An important application of B2B e-commerce has been the interorganizational information system (IOIS) through which multiple organizations interact online to identify and select trading partners, negotiate, and execute business transactions (Bakos 1991). Internet-based IOIS can be considered as an extension of traditional EDI-based systems that enable organizations to transact without investments in dedicated assets. Nonetheless, perhaps the most important development of an IOIS is the web-based B2B *procurement exchange*, which is not merely a more advanced information system that acts as an interorganizational intermediary, but it also offers an *organizational arrangement* with certain institutional structures to coordinate interorganizational relationshipsⁱⁱⁱ. A B2B procurement exchange is defined as a new organizational form residing in digital space that acts as an interfirm intermediary that enables organizations to conduct any-to-any online procurement relationships. Transacting through web-based exchanges may reduce transaction costs, increase the availability of products and suppliers, and reduce dependencies on a few trading partners and products. Moreover, B2B exchanges may offer several secondary services towards integrating purchasing, distribution, and inventory processes, streamlining the entire transaction process, thus allowing better inventory management, quality control, and supply chain processes. Finally, many exchanges may offer collaborative services for joint planning, design, and forecasting (McKinsey 2000). Therefore, B2B procurement exchanges become more flexible coordinating mechanisms with fewer inefficiencies and faster operations compared to physical undertakings. By participating in B2B exchanges organizations can significantly increase their transaction efficiencies; hence, without loss of generality, enterprises can achieve cost-savings by employing B2B exchanges in their e-commerce efforts.

Given the power of B2B procurement exchanges to support business exchanges and offer several IT-enabled services, most enterprises could leverage their capabilities to receive value through e-commerce. The low cost of Internet-based e-commerce increases the scope of B2B exchanges to

touch all organizations irrespective of size, nature of business, and relationship orientation. Therefore, since B2B exchanges redefine how organizations interact with each other, it is important to understand how organizations can benefit from B2B e-commerce through their participation in these exchanges. The academic and business literature has primarily focused on the efficiency-based cost savings associated with e-commerce (Bakos 1998), mainly resulting from lower transaction costs, higher speed, and less 'friction'. While participation in multilateral markets meant loss of electronic integration, the power of B2B exchanges enables markets to achieve comparable levels of technical and business integration as traditional dyadic relationships (Choudhury 1997). Therefore, both buyers and suppliers benefit from these efficiencies. Nevertheless, perhaps the *greatest value* derived from B2B e-commerce can be absorbed by buyers through *effective* e-procurement resulting from better and more informed decisions in selecting suppliers and products, superior planning and forecasting, and obtaining more competitive pricing, better delivery terms, and higher product quality (Kalakota et al. 1999). While efficiency considerations may not greatly depend on exchange type, effective e-procurement mainly results from the selection of an appropriate B2B exchange that dictates the supplier consideration set, the amount and quality of industry and product information, and accompanying services. Therefore, exchange type selection should have a significant impact on e-procurement effectiveness, which is usually determined and measured in terms of supplier performance - competitive price, timeliness of delivery, supplier flexibility, and product quality (Heide and Stump 1995).

The information systems, marketing, and organizational economics literatures on interorganizational relations provide many moderating factors that may affect the selection of appropriate B2B exchanges (e.g. Choudhury 1997, McQuiston 1989, Williamson 1975). These factors can be broadly classified into three main categories – product, organizational, and market characteristics. Product characteristics include asset specificity and product complexity, among others. Company characteristics include procurement importance and novelty, switching costs, and procurement formalization and centralization. Market situational characteristics include a organization's bargaining power, market liquidity^{iv}, product availability, relationship reciprocity (trust), uncertainty, and bargaining power. Finally, the importance and novelty of the purchase to the organization also affects the procurement process. These moderating factors should be taken in account in the selection of appropriate types of B2B procurement exchanges following the proposed classification.

The existing literature covers a broad spectrum of relationships from basic buying and selling (price driven transactions) to joint ventures and network organizations (relationship driven transactions), in addition to exchanges governed by power asymmetry (Frazier and Stewart 2000). Drawing from the literature on inter-organizational relations, we attempt to develop an all-inclusive typology for alternative types of B2B exchanges. This classification scheme is proposed to link existing theories into the new web-based B2B cyberspace and pave the road towards successful e-commerce strategies. Some illustrative real-world examples are also given to better explain each proposed type. Moreover, we discuss several moderating factors such as product, company, and market characteristics that influence the choice of B2B exchange type. In sum, this section attempts to answer the following questions: (1) How can B2B exchanges be classified? (2) How do product, company, and market characteristics affect the selection of the type of B2B exchanges?

CONCEPTUAL DEVELOPMENT

Selecting B2B procurement exchanges is a challenging decision for most organizations given the number of alternatives available in today's e-commerce environment. Other than an IOIS, a B2B exchange can be considered as a structural arrangement for the *governance* of economic activity. Following Williamson and Ouchi (1981), governance refers to the "mode of organizing transactions," which includes elements of structuring relationships, as well as their enforcement. Malone, Yates, and Benjamin (1987) proposed two forms of governance structure for B2B exchanges based on Transaction Cost Economics (TCE): electronic markets with price-driven transactions, and electronic hierarchies where organizations form dyadic relationships through managerial authority. Similarly, according to Macneil (1980), interorganizational relations could be classified into discrete versus relational exchanges. Discrete exchanges are characterized by independent transactions that only involve a transfer of ownership, whereas relational exchanges are described by a mutuality of interests between organizations where the historical and social context matters. From a marketing perspective, a relational exchange or dyadic relationship is embedded into the social context, which modifies the nature of the relationship based on cooperative norms rather than pure self-interest (Dwyer, Schurr, and Oh 1987).

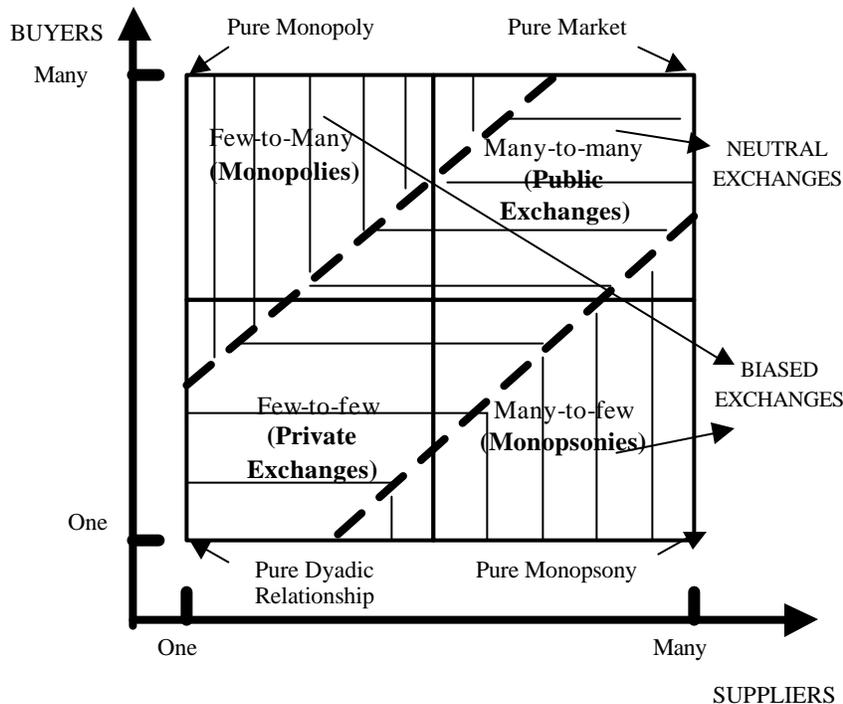
The marketing and economics literature has focused on markets and relational exchanges (hierarchies) (Heide 1994, Malone et al. 1987). Drawing on this distinction, B2B exchanges can thus either take the form of participation in an electronic market or participation in an electronic hierarchy. Nonetheless, this simplistic classification cannot adequately capture the whole spectrum of B2B exchanges, which have substantially different characteristics in terms of (a) their industry and product focus (vertical vs. horizontal), (b) relationship concentration (impersonal vs. relational), (c) asymmetries between organizations (biased vs. neutral), and (d) type of sourcing (systematic vs. spot). Consequently, the immense complexity of today's B2B exchanges requires a more multifaceted classification. Choudhury (1997) proposed a typology of IOIS that consisted of electronic monopolies, electronic dyads, and a multilateral IOIS such as the electronic market. Kaplan and Sawhney (2000) classified governance structures for B2B exchanges in terms of manufacturing and operating goods (vertical vs. horizontal), and spot against systematic sourcing. Bakos (1991) proposed various types of functional structures that interconnect suppliers, customers, and intermediaries. These taxonomies may be able to capture a sufficient portion of the spectrum of B2B exchanges, but none of them is able to independently cover all types of B2B exchanges. Therefore, an all-inclusive classification scheme needs to be designed to cover the entire spectrum of B2B exchanges. Rather than attempting to inductively determine a classification scheme, a deductive approach should be employed drawing on the fundamental dimensions of interorganizational relations.

Three primary structural dimensions - reach, range, and reciprocity – can be assumed to span the dimensions of interorganizational relations (El Sawy and Nissen 1999). The dimension of *reach* is proposed to measure the number of potential partners to which a organization has likely access. The *range* dimension is proposed to measure the variety of products within the organization's reach. The *reciprocity* dimension measures in aggregate the strength and directionality of the interorganizational relationships. Based on these fundamental structural dimensions, we attempt to link interorganizational relations with B2B exchanges. Hence, reach would specify the number of a organization's potential trading partners in a B2B exchange

(exchange participants), range would dictate the availability of products in the exchange, and reciprocity would state the nature of the buyer-supplier relationships in the exchange. Therefore, these three dimensions should be able to adequately determine the type of B2B exchange and propose a versatile classification scheme.

The dimension of reach is proposed to classify B2B procurement exchanges in an all-inclusive typology, and implicitly account for the range and reciprocity dimensions. Reach measures the number of potential partners to which a organization has likely access in a given exchange, relating positively to the number of opportunities that a organization can potentially pursue. Combining the reach dimension from the perspective of both buyers and suppliers, a two-dimensional classification scheme arises which measures the *proportion* of buyers to suppliers, or vice versa. The proportion of buyers to suppliers can create a 2X2 typology that distinguishes the type of exchange based on the number of participating organizations. Despite the relative simplicity of this typology, it has the immediate benefit of an all-inclusive, yet parsimonious classification scheme. This typology includes all previously suggested types such as markets, dyads, monopolies, monopsonies, and relational exchanges, and implicitly encompasses previous dimensions such as product focus, relationship concentration, asymmetries between buyers and suppliers, and type of sourcing.

FIGURE 1
GRAPHICAL REPRESENTATION OF THE PROPOSED
TYPOLGY FOR THE FORMS OF B2B EXCHANGES



When any participating buyer or seller in a B2B exchange views an equal number of potential partners, there is a balanced proportion of organizations, dictating a neutral exchange that may be one-to-one, few-to-few, or many-to-many (suppliers-to-buyers). Similarly, when there is an imbalance proportion, exchanges become progressively biased that may be many-to-few, few-to-many or more extreme (many-to-one or one-to-many). This approach gives a two-dimensional classification scheme with four extreme points and four distinct quadrants, as shown in Figure 1. First, when the reach dimension is many for both buyers and suppliers (many-to-many) *markets* arise, covering the upper left quadrant. The opposite extreme point arises when the reach of each buyer and supplier is only one (one-to-one), signifying a traditional *dyadic relationship*. The lower right quadrant spans a region where few qualified organizations form a reserved exchange (few-to-few). The two other outermost points in the 2X2 matrix are extreme situations where a single organization having a great reach of potential partners dominates the exchange. The upper left corner (one-to-many) shows a *monopoly* where a single supplier may sell to many buyers. Equally, the lower right corner shows the case of a *monopsony* exchange where one buyer purchases from a great number of suppliers. Similarly, the two adjacent quadrants cover the area of biased exchanges (few-to-many and many-to-few), respectively.

The proposed classification scheme is an all-inclusive two-dimensional typology that covers all types of alternative forms of B2B exchanges. It is robust to encompass the notions of neutrality and bias and it readily relates to concepts from organizational economics (markets, monopolies, and monopsonies) and marketing (dyadic relationships). Furthermore, its conceptual simplicity and parsimony make it superior to previous descriptive taxonomies since many factors of interorganizational exchange behavior (product, organizational, and market characteristics) can be linked into a coherent theoretical framework. Finally, despite its reliance on a single dimension, the other two fundamental structural dimensions of range and reciprocity can be integrated. The dimension of range covers vertical markets that deal with industry-specific products and horizontal markets carry products that all industries can use. Despite earlier attempts to classify exchanges as vertical and horizontal (Kaplan and Sawney 2000), recent findings showed that both types of products are often traded within the same B2B exchange (Dai and Kauffman 2000). Based on network externalities, the greater range of products available in the same exchange, the greater benefits a organization receives from streamlining its operations through B2B exchanges dealing with both vertical and horizontal markets. Moreover, the proposed types of exchanges usually reflect the range of products traded. Therefore, there is no need to draw an additional dimension for range when the theory of network externalities dictates that the extant dimensions may cover product type. Similarly, the dimension of reciprocity is related to the number of participating organizations (Heide 1994) and power bias (Kumar, Scheer, and Steenkamp 1995). Therefore, the proposed taxonomy also encompasses interorganizational reciprocity.

Neutral Exchanges

Neutral exchanges are either large-scale marketplaces that enable many buyers to reach many suppliers, or small-scale marketplaces that enable one or a few buyers to reach a small number of selected suppliers. Many-to-many B2B exchanges are usually public markets where enterprises interact with either a *dynamic* or *static* pricing, while one-to-one or few-to-few B2B exchanges are usually private, organization-driven markets with negotiated or hierarchical pricing.

Many-to-Many (Public Exchanges)

B2B procurement exchanges have radically transformed interorganizational relations by allowing electronic integration among multiple buyers and sellers where the cost of searching, participating, and transacting is sufficiently affordable. A many-to-many procurement exchange allows a virtually infinite number of organizations to transact electronically with minimal costs. Such B2B exchanges allow buyers to choose among a large number of suppliers for a set of products, whereas sellers have many buyers to promote their products. However, the presence of a great number of organizations in this type of exchange precludes strong interorganizational relationships. Despite the lack of high reciprocity, information sharing, feedback mechanisms, and accreditation efforts can be insured through the exchange, which enables a basic level of impersonal trust. Therefore, many-to-many B2B exchanges benefit from high reach, whereas they are usually low in the range and reciprocity dimension. Public exchanges create value by *matching* many organizations through negotiated prices (dynamic pricing), and also by *aggregating* a large number of organizations (static pricing). The matching mechanism is particularly effective in true price discovery, delivery terms, and product quality as organizations dynamically interact through the process of supply and demand or the auction mechanism. Aggregation is effective when multiple suppliers post their products through a catalog, and buyers are able to conveniently search for the best prices, quality, and delivery terms.

Dynamic pricing (Matching)

When many organizations interact in a B2B exchange, a dynamic mode of pricing can be used to discover the market price of a product. Similar to stocks in the New York Stock Exchange, commodity goods enable supply and demand forces to find the Pareto optimal allocation of price, quality, and delivery terms. Many-to-many exchanges fit classical economic theory where perfect competition with infinite suppliers and buyers exists, entry and exit barriers are low, and the focal good is low in asset specificity (commodity). If enough liquidity is built into the system, a public exchange closely resembles the ideal market, which is theoretically the most efficient trading structure, or perfect competition (Varian 1984). Nonetheless, high liquidity can be achieved only when a great number of organizations transact particular commodities. Hence, the range of obtainable products is usually very low. However, dynamic pricing is only feasible in markets characterized by commodities, where trading is based on a limited number of product characteristics. Fluid pricing, quality, and delivery terms that are based on interactive negotiation between buyers and suppliers who quickly adapt to changing market conditions characterize such B2B exchanges. Dynamic pricing can also take the form of an auction, but this mechanism may favor the supply side (forward auctions) or purchasing side (reverse auctions).

Neutral B2B procurement exchanges with dynamic pricing may be economically efficient, but they are restricted by four factors: reach, range, power asymmetry, and reciprocity. First, the availability of trading partners is a crucial issue. If organizations do not have the required reach, markets will lack liquidity and will cause uneven pricing and other inefficiencies. Second, only a small number of commodities with simple descriptions can be traded. Product differentiation, which is usually driven by suppliers to gain a 'niche', reduces liquidity. Third, large buyers or suppliers would use their negotiating power to receive better deals rather than getting the market price. Finally, to allow a true liquid and unbiased market, many-to-many exchanges require

anonymity. However, many buyers seek high-reciprocity partnerships with suppliers to safeguard the integrity of the transaction, increase coordination, and reduce uncertainty. Therefore, despite attempts to increase interorganizational trust in such marketplaces, reciprocity is a critical factor that limits the extent of many-to-many dynamic B2B exchanges.

Altra.com (www.altra.com) is one of the most prolific many-to-many B2B exchanges that connect multiple organizations into a neutral dynamic-pricing marketplace, offering a real-time, online system for trading natural gas, power, natural gas liquids, and crude oil. Similar to a stock exchange, buyers and sellers can view and exchange bids and offers quickly, remaining anonymous until they reach an agreement. Altra.com provides a great reach for its market participants by having over 6,000 organizations worldwide. In addition, high liquidity is another characteristic since a tremendous amount of energy is transacted through Altra's exchange. Moreover, the gas and power industry is fragmented with not many powerful traders being able to affect the market; hence, bias is a minimal issue. However, the range of products in this exchange is very small since only gas and power related commodities are exchanged. In addition, the participants' reciprocity is rather low given that all transactions are anonymous until an agreement is reached. Nonetheless, this concern is addressed by allowing scheduling for purchases, viewing transactions, tracking energy positions, and generating invoices and remittance statements. Therefore, this B2B exchange offers a variety of secondary services to allow electronic integration, monitoring, physical scheduling, and reconciliation of all completed transactions to establish a basic level of reciprocity among organizations. In sum, similar to the characteristics of the proposed many-to-many dynamic market, the reciprocity among organizations is rather low, the range of products is limited, but the reach and liquidity offered by Altra's B2B exchange is very high.

Static pricing (Aggregation)

The most common type of many-to-many B2B exchanges is based on catalog aggregation using posted prices. Static markets are characterized by fixed prices and offers from many industry suppliers, where terms and conditions are usually posted to allow a convenient, one-stop procurement. While static pricing allows room for inefficiencies and uneven pricing, it also allows a greater number of similar products to be traded, increasing the availability of suppliers (reach) and products (range). These marketplaces can accommodate products with more complex description and greater specificity, allowing more product differentiation and less competition among suppliers. Therefore, the reach of the purchasing side and the range of products available in the aggregation mechanism are greater than in the matching mechanism. Static pricing can be particularly effective when search costs are high but the timeliness of the purchase is crucial. Therefore, buyers can receive a competitive price and quality through conveniently searching over a great number of competing suppliers and products, and also assure favorable delivery and warranty terms by selecting qualified suppliers. In terms of reciprocity, aggregating exchanges are rarely anonymous, allowing a certain level of reciprocity between organizations.

Assetsmart.com (www.assetmart.com) is a catalog-based B2B exchange with a comprehensive list of high-technology equipment. The static pricing model allows a great number of products from many suppliers to be traded in a single B2B exchange. In the Assetsmart.com marketplace, by allowing sellers to reveal their identity -- reputable suppliers can still leverage their brand

name while communication may occur before purchasing. Moreover, the exchange provides detailed information about products thus reducing the products' complexity and specificity and making purchasing more accessible. In addition, an organized search engine makes finding products easy through a robust online catalog, automating the purchasing process from requisition to payment, and making purchasing possible. Finally, Assetsmart.com directly addresses reciprocity concerns by monitoring every step of the fulfillment process, streamlining the business processes and supply chain, notifying organizations if any problems occur, and providing order fulfillment and status information.

Few-to-Few (Private Exchanges)

Many industries depend on long-term relationships built over many years based on cooperative adjustments and mutual management of the supply chain. Even if many-to-many B2B procurement exchanges receive a great deal of attention, few-to-few exchanges for coordinating transactions will also play a role in e-commerce. Close relationships between a small number of organizations promote collaboration, coordination, and expertise sharing. Few-to-few or one-to-one private exchanges benefit from web-based technologies; while EDI has been the most common method for automating procurement, its extent was limited by its substantial cost that made it only accessible to large organizations with recurring volume of purchases. However, the use of the Internet makes electronic integration economically accessible to small-scale B2B exchanges. Markets are assumed to be low in trust and fail when relationships must be deep to account for specific, specialty goods with complex and unique descriptions that require relationship-specific initial investments, such as interorganizational learning (Williamson 1975). Therefore, unlike markets that are driven mainly by the price mechanism, specialty goods require reciprocity among organizations (Dwyer et al. 1987).

Private exchanges are created when there is a cooperative relation between organizations that extends beyond a single transaction. A strategic alliance is a form of exchange that requires close collaboration, coordination, and exchange of private information between few organizations (Bakos and Brynjolfsson 1993). The initiation of dyadic relations is based on selective entry through quality screening. The relationship is maintained by communication that provides role specification, proactive planning, mutual adjustment through reciprocal negotiation, internal monitoring, a long-term incentive system, and enforcement based on joint cooperation. Few-to-few exchanges usually have high levels of reciprocity that create value by capturing the long-term benefits of high-trust relations by enabling custom-made solutions that assure customized product quality, timeliness of delivery, and favorable pricing and warranty terms (Zaheer et al. 1998). These exchanges are effective when purchasing is of strategic importance and buyers wish to assure supplier reliability, competence, and qualification, and also when switching to other suppliers is costly.

Buzzsaw.com (www.buzzsaw.com) offers customizable solutions for organizations in the construction industry to meet, collaborate, and design, plan, and administer joint projects. A variety of collaborative services enabled by this exchange are most likely to maximize satisfaction while minimizing cost, especially for specialty products with complex specifications, features, and options. Buzzsaw.com attempts to solve the problem of asset specificity by

providing qualification, document sharing, extensive communication, and one-to-one negotiation. Collaborative platforms facilitate communication, knowledge sharing, and joint administration at every step of the construction process, promoting a high level of reciprocity among organizations. Therefore, Buzzsaw.com provides the infrastructure and related services for relationship initiation, role specification, and joint design and planning. However, such services are primarily useful to close relationships and complex transactions; hence, the reach of participating organizations and range of products are relatively limited.

Biased Exchanges

Whereas neutral exchanges may ideally be the most efficient governance mechanism, *bias* is an inevitable attribute of interorganizational relations, since either side may possess buying or selling bargaining power because of industry structure, the nature of the focal product, or size. Auctions are well-understood examples of biased markets. Traditional forward auctions favor suppliers since many buyers compete for a single product and raise the product's price, whereas reverse auctions favor buyers by having multiple suppliers bidding downwards for a single purchase, thus dropping the product's price. For buyers, the greater reach to many suppliers and the greater number of products, the more value it can capture through more favorable transaction terms. A great reach of suppliers in a B2B exchange provides positive network externalities to the purchasing side that translates into more effective procurement. Conversely, a low reach of suppliers compared to the number of buyers can result in adverse network externalities and reduction in effectiveness to the procurement side.

Many-to-One (Monopsonies)

While it has been argued that e-commerce will eliminate power asymmetry and dependency among organizations, traditional powerful buyers capture benefits by leveraging their existing physical power (e.g. reputation, size, purchasing volume) into online B2B exchanges. According to neoclassical theory, any form of power against a competing supply side could result in better outcomes for the demand side, and vice versa (Varian 1984). Monopsony, which translates into *sole buying*, is the case of few buyers facing multiple sellers. Industries with pyramid shapes have a few big buyers and a fragmented mass of suppliers. Examples of such markets are the automotive and the apparel industry where a small number of large buyers (e.g. Ford, GM and Sears, Roebuck) have access to a great number of small suppliers. Many-to-one B2B exchanges occur when a single or few buyers support a marketplace with multiple competing suppliers. Monopsony allows the buyer to benefit from multiple competing suppliers, while facing no major antagonism from other buyers. Moreover, the range of products is limited to the assets at which the buyer has substantial power, and these purchases are important to its bottom line (Kaplan and Sawney 2000). The dimension of reciprocity is still under debate; whereas monopsony has created long-term trusting relationships in some industries (Kumar et al. 1995), such dependency forces organizations to leave the exchange or create coalitions to reduce the bargaining power of the other side. In general, the notion of bias is a challenging research issue; hence, it would be an interesting research area for B2B exchanges.

Covisint.com (www.covisint.com) is a procurement B2B exchange that connects the major U.S. automakers (GM, Ford, and Daimler Chrysler) with many fragmented suppliers in the automotive industry, through a supplier network, formerly known as the Advanced Network Exchange (ANX). The purpose of this B2B exchange is to facilitate and simplify trading between traditional big manufacturers and the over 30,000 suppliers in the automotive industry. In Covisint.com, the supply side consists of few powerful players with tremendous bargaining power and a fragmented supplier side. This B2B procurement exchange allows an enormous range of products to be traded, mainly based on contracts, reverse auctions, and negotiations. The power asymmetry in this B2B exchange naturally results in substantial value for the big buyers in terms of pricing, quality, and delivery terms. However, by implementing a powerful procurement system for transacting with many suppliers, the large automakers through investing in Covisint.com incurred a considerable ongoing expense to maintain such extensive technological platform. Therefore, whereas many-to-few exchanges favor the purchasing side, there are considerable expenses associated with running the B2B exchange, which need to be supplanted by the benefits than monopsony offers. Finally, given the long history of the automotive industry in the United States, the notion of reciprocity in this B2B exchange is still a debatable issue that draws from existing relationships. Therefore, the future of Covisint.com is interesting both from an academic and managerial perspective.

Few-to-Many (Monopolies)

Industries with inverse pyramid shapes have a few big suppliers and a fragmented mass of buyers. This mechanism is the primary model for business-to-consumer e-commerce, where a large supplier trades its products to many individual buyers (consumers). Monopoly exchanges have begun appearing in B2B markets initiated by large companies, such as Cisco, Staples, and Grainger. From a theoretical perspective, monopolies are important coordinating mechanisms that received considerable attention (Varian 1984). The range of products is undeniably restricted to the assets at which suppliers have some monopoly power. e-Procurement in monopoly exchanges is usually ineffective and may result in poor transaction terms. Therefore, buyers may either seek to increase their reach through finding new suppliers, aggregate their power in many-to-many B2B exchanges, or establish one-to-one relations with a specific supplier. Nevertheless, few-to-many procurement exchanges are important coordinating mechanisms that suppliers should take advantage of. Similar to monopsony exchanges, bias creates an interesting issue associated with the dimension of reciprocity among participating organizations.

Staples.com (www.staples.com) is a monopoly B2B exchange that promotes its office-related products. This one-to-many dynamic pricing configuration allows organizations to buy specially configured systems with unique combinations of product features directly from this large supplier of horizontal products. This B2B exchange allows Staples.com to leverage its selling power in office products to target buyers of different sizes through a cost-effective marketplace. On the procurement side, buyers can take advantage of the increased buying flexibility offered by this exchange to transact with Staples.com, which expands its reach to many organizations, allowing new avenues for incremental business. Therefore, monopoly B2B exchanges may provide flexibility towards streamlining the supply chain, even if it may not be the most effective procurement solution.

A table representation of the different types of B2B exchanges based on the proposed taxonomy along with some examples is shown in Table 1. It should be noted that this classification is not exclusive since a single B2B exchange may target various quadrants. For example, Fasturn.com (www.fasturn.com) operates simultaneously in both the one-to-many and many-to-many exchanges.

TABLE 1. TYPOLOGY OF THE FORMS OF B2B EXCHANGES

TYPE	Pricing	Orientation	Examples
Many-to-Many (Public Exchanges)	Dynamic (Matching)	Neutral	Altra.com Chemconnect.com
	Static (Aggregation)		Assetsmart.com Freemarkets.com
Few-to-few (Private Exchanges)	Negotiated		Buzzsaw.com Citadon.com
Few-to-Many (Monopoly)	Posted	Biased (Supplier)	Staples.com Granger.com
Many-to-Few (Monopsony)	Static	Biased (Buyer)	Covisint.com AutoXchange.com

FACTORS INFLUENCING THE SELECTION OF B2B EXCHANGES

Despite the significant efficiency improvements that B2B procurement exchanges can offer, the most important aspect of e-commerce is perhaps effective sourcing solutions. Successful e-commerce is a combination of transactional efficiencies, information acquisition, partner selection, and relationship management, and also optimum design, planning, and decision-making, among others. Each exchange type determines the number of potential partners (reach), the availability of products (range), and the nature of the buyer-supplier relationships (reciprocity). For example, each procurement exchange type shapes the nature of the services offered; few-to-few exchanges emphasize collaborative services, while many-to-many highlight search engines and transaction-facilitating services. In addition, through reach, range, and reciprocity, exchange type influences transactional terms such as price, timeliness of delivery, and product quality (Heide and Stump 1995, Zaheer et al. 1998). For instance, few-to-few and many-to-few exchanges emphasize product quality, whereas many-to-many and few-to-many stress the importance of competitive price and delivery terms. Therefore, each type of B2B procurement exchange has a dissimilar approach of creating value by differently affecting these terms.

Other than the dimensions of reach, range, and reciprocity, there are also other factors that influence the choice of B2B exchanges, such as product, organizational, and market attributes. In general, the factors related to product characteristics are asset specificity and procurement complexity; factors associated with organizational characteristics are purchase importance and

novelty, formalization, centralization, and switching costs; in terms of market characteristics other factors are uncertainty and transaction activity. By taking in account these additional factors, a more informative selection of a B2B exchange could result in higher value creation.

Product Characteristics

TCE maintains that product *specificity* is the most critical dimension for determining the nature of cooperation in an economic transaction (Williamson 1975). A product is highly specific if other organizations cannot readily use this asset because of site, physical, human, or time specificity. Where product specificity is great, organizations usually make efforts to choose B2B exchanges with a long-term orientation and avoid spot transaction. Therefore, high product specificity is associated with smaller-scale B2B exchanges where quality is more important than price. The usual distinction of product specificity deals with commodities versus specialty items; many-to-many B2B exchanges may be more appropriate for commodities, whereas specialty items necessitate a small number of accredited suppliers. Purchase *complexity* is defined as the amount of information required in making an accurate evaluation of a product (McQuiston 1989). Traditionally, product complexity discouraged electronic markets (Malone et al. 1987); however, electronic catalogs and search engines usually found in any type of exchange enable buyers to search for products irrespective of complexity. Nonetheless, products with complex descriptions are difficult to be transacted in a many-to-many exchange with dynamic pricing since liquidity requires simple descriptions.

Organizational Characteristics

Purchase *importance* is associated with the perceived impact of the purchase on organization profitability (McQuiston 1989). While any type of B2B exchange could accommodate products that affect a organization's bottom line, important purchases may necessitate the establishment of private many-to-few or few-to-few exchanges with a trustworthy network of suppliers. In addition, important purchases might require a many-to-many exchange to avoid opportunity costs associated with relying on a few suppliers and ineffective pricing. Purchase *novelty* is defined as the lack of experience of a organization with similar procurement situations (McQuiston 1989). When buyers are faced with novel purchasing situations, a normal approach is to acquire more information, decreasing the likelihood that buyers would rely on a small set of suppliers, and that they are likely to explore all potential opportunities, particularly electronic catalogs that provide a comparison-shopping. Purchase *formalization* refers to the formal procedures governing a organization's procurement process. The extent of formal organizational constraints imposes a disincentive to the buyer organization to search for all alternatives. Therefore, buyers will prefer to work with a small group of suppliers to avoid the pressure of formalization when new suppliers are selected. Purchase centralization refers to the concentration of decision-making authority for procurement to a small number of people at high organizational levels. The extant purchasing literature suggest that centralization leads to considering a large number of suppliers and selecting new ones.

Switching costs measure a organization's expected costs of crafting a new relations. While the cost for participating in established exchanges is relatively low, the initial cost for establishing a private exchange may be considerable. Moreover, *technological compatibility* assesses the

degree to which the compatibility of a B2B exchange with the buyer's existing internal system is an issue. In case of compatibility problems, organizations incur costs to assure that an exchange is compatible with their legacy systems, costs that are commonly referred to as transient disconnectivity. Finally, organizations face switching costs because of established relationships with particular partners that required specific investments. In sum, switching costs act as disincentives to explore new opportunities; therefore, an appropriate selection of a B2B exchange should take in account for potential switching costs associated with it, and assure that the benefits outweigh these costs.

Market Characteristics

Uncertainty can arise from many factors, such as technological considerations and environmental conditions, and usually forces organizations to rely on a small number of trustworthy partners. Uncertainty includes technological heterogeneity, which measures the diversity that characterizes the different dimensions of the product-related market. Another source is the pace of technological change, which measures the buyer's perceptions of the extent to which a product's dimensions are rapidly changing. In addition, market conditions and information asymmetry impose demands on the organization's processing capacity, which further increase the level of uncertainty. All these sources of uncertainty jointly contribute to fewer and more reliable suppliers. Finally, another important factor that organizations need to consider in today's B2B e-commerce is *transaction activity*. The future of independent B2B exchanges depends on organization participation and activity. While there is probably not a theoretical interest, organizations should ascertain that the chosen exchange is likely to maintain adequate transaction activities to remain in business.

Consortium Exchanges

Consortia are B2B exchanges that attempt to provide a technological and organizational platform to enable interaction among organizations within an existing association or network. For example, Covisint.com (www.covisint.com) is considered a consortium exchange, built around an existing automotive association. Rather than joining a newly formed B2B exchange with new partners, organizations usually prefer leveraging their existing relations into e-commerce. Following the proposed classification, consortium exchanges can lay anywhere along the proposed spectrum; for example, Covisint.com lies in the monopsony region. The future of consortium-based as opposed to public B2B exchanges is an interesting managerial and theoretical issue.

DISCUSSION

The major contribution of this research is the proposed two-dimensional typology that integrates alternative forms of B2B relations that were not adequately captured by previous taxonomies. Our typology covers the entire spectrum of B2B exchanges and attempts to implicitly account for all aspects that have not been adequately examined before, such as bargaining power and reciprocity. Moreover, by employing the single dimension of reach as the major sorting mechanism, the chaotic spectrum of B2B exchanges can be graphically represented on a

straightforward 2X2 typology. Without loss of generality, the chaotic environment of today's B2B exchanges can be easily classified around two dimensions, representing a parsimonious and comprehensive typology.

A second contribution of this research is the incorporation of existing theories from Information Systems, Economics, and Marketing into the proposed classification scheme. This scheme draws on previous research on B2B relationships from the economics and marketing literature to integrate IOIS into a coherent scheme that captures key features of e-commerce. First, the distinction between many-to-many versus one-to-one depicts the division between electronic markets and hierarchies from organizational economics (Williamson 1981, Malone et al. 1987) and markets and dyadic relationships from marketing channel relationships (Macneil 1980, Heide 1994). Therefore, notions from the distinct disciplines of economics and marketing are integrated with Information Systems literature to produce a novel classification scheme that has strong roots in existing theory. Moreover, our typology also captures the practical dimensions of spot versus systematic sourcing (Kaplan and Sawhney 2000). In sum, the proposed taxonomy takes into account various disciplinary approaches as well as practical dimensions.

A third contribution of this research is an attempt to link the proposed typology with additional factors present in interorganizational relations. Several product, organizational, and market characteristics need to be considered in the selection of the exchange type to achieve greater value from e-commerce. This section described these factors and discussed their importance with selecting a type of B2B exchange following the proposed classification scheme. These factors are drawn from existing theories from organizational economics and marketing and hold substantial value in influencing interorganizational relations. Therefore, there is considerable evidence to suggest that these factors should be applied to selection of both the general type of B2B exchanges and also for specific B2B exchanges. While our typology holds for e-commerce relations, it theoretically applies to B2B relations both in the physical and e-commerce. Our assumption is that web-based IOIS enable electronic integration of any-to-any relations and promote transactional efficiencies irrespective of the number of participating organizations. Therefore, the dimension of reach can be readily applied to any type of B2B relations. Nevertheless, in the absence of low-cost, web-based IOIS, many-to-many exchanges are practically inapplicable.

CONCLUSION

Given the rapid development of electronic B2B procurement exchanges, it is important to understand the complexity of interorganizational relations based on a complete, parsimonious, and versatile typology. The proposed typology provides a simple and robust method to guide researchers and practitioners to identify alternative types of B2B exchanges in today's chaotic e-commerce. From a managerial perspective, not only can managers could select the most appropriate type of B2B exchange, but they are also given a set of additional factors to consider on making their selection. Based on product, organizational, and market characteristics, organizations can appropriately weigh these factors in their decisions for both the type and particular selection of B2B procurement exchanges.

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SECTION 2

A Process Services Model for B2B Procurement Exchanges and Empirical Results

ABSTRACT

This paper focuses on e-procurement and proposes a comprehensive business process model for procurement B2B exchanges. Given the increasing importance of collaborative buyer-supplier relationships, this research expands previous transaction-driven procurement models by incorporating processes that aim to capture collaboration, such as joint planning and design, and also collaborative process management. Several sub-processes are described to better illustrate the proposed model. In order to improve the procurement process, this study describes a set of IT-enabled services around procurement that aim to create value. Following the proposed procurement process model with value-added services, several design questions for B2B exchange organizations are posed. Based on six interpretive case studies with procurement B2B exchange organizations, we discuss several new findings and propose a set of fifteen new insights for the role of B2B exchanges on e-procurement. This paper concludes by discussing the implications of this study for acquisition theory and practice, recommending solutions to improve the procurement process, and suggesting future research directions.

INTRODUCTION

Increasing demands on input quality, cost reduction, customer service, continuity of supply, and demand planning have significantly broadened the scale, scope, and immediacy of procurement (Freeman and Cavinato 1990, Gadde and Hakansson 1994, Leenders, Fearon, and England 1997). The importance of procurement has been stressed by Porter (1985), who defined procurement as a support activity that spans all primary activities in the value chain and facilitates their completion. Procurement has recently become particularly important following the trend toward outsourcing everything except the organization's core competencies (Hotabe and Murray 2001).

Electronic procurement (e-procurement) does not simply mean buying products and services over the Internet; e-procurement is described as the end-to-end set of IT-enabled activities employed to automate the acquisition of products, materials, and services, virtually integrate an organization's supply chain infrastructure, and electronically manage the quality of goods and suppliers. According to Heppelmann (Industry Week 2001, p. 24), e-procurement is not simply about reducing procurement costs, but also about product improvement that is likely to affect revenues. This view is shared by Deloitte Consulting (www.dc.com) that expects e-procurement to fundamentally change the dynamics between companies and their suppliers; their study showed that companies investing in e-procurement expect an average of 300% return on investment over the first few years (Roche 2001, p. 58). Finally, the Aberdeen Group (www.aberdeen.com) argues that e-procurement is one area of e-commerce that delivers rapid and quantifiable results.

E-procurement has undergone a colossal growth in the last few years, and recent reports indicate that Internet-based B2B exchanges are playing an increasingly critical role in interorganizational procurement. The Gartner Group (www.gartner.com) estimates that online B2B procurement was \$75 billion in 2000 and is expected to exceed \$3 trillion by 2004. Similarly, Forrester Research (www.forrester.com) predicts that procurement over B2B exchanges will reach \$2.7 trillion in 2004 (Blackmon 2000). Deloitte and Touche (www.us.deloitte.com) predicts that B2B e-commerce will be six times larger than business-to-consumer e-commerce by 2003. In addition, many analysts envision substantial procurement gains from electronic B2B e-commerce. For example, the Aberdeen Group (www.aberdeen.com) estimates 5-10% price reduction in products and services, 5 days time reduction in the average purchase and fulfillment cycle, \$77 per order requisition savings, and 25-50% decrease in inventory costs (Pekala 2000). Goldman Sachs (www.gs.com) expects a 10-20% reduction in procurement processing costs in several industries, and the Boston Consulting Group (www.bcg.com) expects productivity improvements of 9% within the next few years (Cohn, Brady, and Welch 2000). Forrester Research has shown that enterprises expect to save more than 4% on total purchases through B2B exchanges in 2001, and to double these savings over the next two years.

Whereas B2B exchanges were originally introduced mainly as marketplaces for basic transactions, many successful B2B exchange organizations have recently broadened their features beyond the initial typical marketplace offerings. This is in response to the initial criticism that B2B exchanges would not create adequate procurement value by focusing solely on purely commerce activities (Miller 2001). In fact, Forrester Research (www.forrester.com)

argued that many B2B exchange organizations failed to provide complete service offerings that would make the procurement process efficient and cost effective. According to GartnerG2 (www.gartner.com), many B2B exchange organizations have recently broadened their offerings to rely on a wider spectrum of business services, like supply-chain collaboration and demand forecasting services. Indeed, the business plan of some prevalent exchange organizations like e-steel (www.e-steel.com) is being dominated by value-added services. Even if Sculley and Woods (1999, p. 165) maintained that the commerce function is the initial magnet for B2B exchanges, IT-enabled services around the procurement processes seem to become the major element of success in today's e-procurement.

B2B exchange organizations can provide the technological infrastructure and services to reduce inefficiencies, improve information flow, and foster collaboration between trading partners by streamlining and redesigning the procurement process (Stevens 2001). Procurement value can be created in several ways by providing facilities and services to a network of buyers and suppliers for collaborative and competitive purchasing of goods and services (Sculley and Woods 1999). Moreover, B2B exchange organizations can provide a secure environment to facilitate and optimize procurement by delivering integrated, collaborative, and tailored content to participating enterprises, lower procurement processing costs, reduce spoilage rates and inventory, and improve forecasting and planning accuracy. Another source of value that B2B exchange organizations provide is the collection of best-of-breed software solutions for procurement that can offer a standardized cost-effective solution.

This research aims to identify ways that IT-enabled services can engender procurement value by focusing on the business process as the unit of analysis. Barua, Kriebel, and Mukhopadhyay (1995) argued that the measurement of IT-enabled value has to occur at the level where IT is implemented, proposing a measurement approach at the business process level. This process-centric perspective has been employed by other researchers who argued that the first-order effects of IT take place at the process level by improving individual business processes (Crowston 1986, Mooney, Gurbaxani, and Kraemer 1995, Tallon, Kraemer, and Gurbaxani 2000). Furthermore, Heckman (1999) argued that two recent trends suggest that a disciplined, process-oriented framework should be employed to understand and manage procurement. The first trend is the evolution of procurement as a structured, market-oriented discipline, and the second trend is the recent expanded focus on business process analysis and design. In sum, there is increasing evidence for the importance of focusing on individual business processes toward capturing value from IT investments. Therefore, this paper examines procurement as a set of individual processes at which IT-enabled services aim to create value.

This paper proceeds as follows: The next section describes the procurement process, distinguishes between primary and support processes, and proposes a procurement business process value chain model. The following section describes a set of IT-enabled services that aim to improve and add value to the primary and support procurement processes. The paper proceeds by framing a set of design questions that B2B exchange organizations need to consider when providing their procurement services. In order to shed light on these questions, a set of case studies from six B2B exchange organizations are discussed. The paper concludes by discussing the implications of this research for e-procurement.

THE PROCUREMENT PROCESS

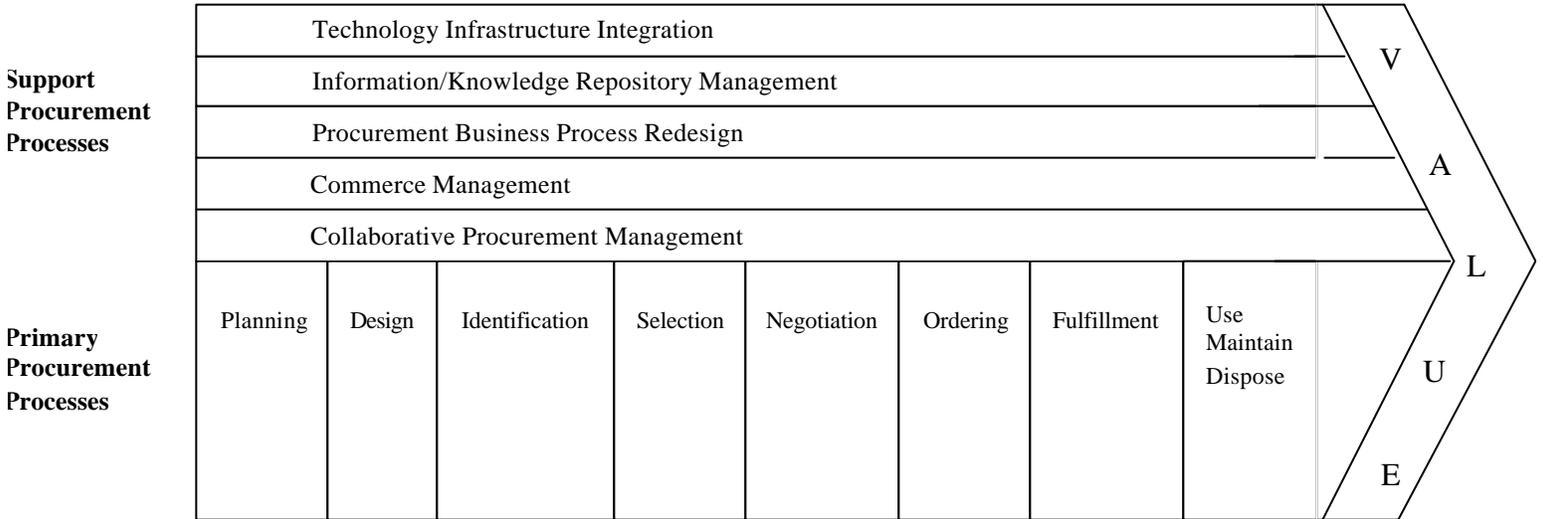
The procurement process is a set of activities performed in the acquisition of products and services. According to Davenport and Short (1990), a business process is a set of logically related tasks performed to achieve a defined business outcome. Following Nissen, Snider, and Lamm (1998) and Gebauer, Beam, and Segev (1998), the procurement process is defined as the set of tasks performed to develop, obtain, and support the acquisition of products, materials, and services and manage their inflow into an organization toward the end users. The procurement process also integrates an organization's supply chain and assures and manages the quality of suppliers and products. In this context, the procurement process includes early forecasting and product design activities.

The procurement process is a complex process that is difficult to define, comprehend, and manage in practice (Novack and Simco 1991). In order to comprehend the procurement process, the individual processes need to be identified and integrated into an ordered stream of interrelated activities. The proposed framework attempts to impose structure on the procurement process in order to allow a systematic analysis and management of procurement efforts. This model describes the processes and subprocesses involved in an organization's procurement efforts. By examining the individual processes in detail, it is possible to gain insight into tasks that can be improved through support by electronic and network services.

Several sources have been consulted toward developing the proposed framework. Nissen (1997) proposed the "Commerce model," a high-level process view of procurement. Novack and Simco (1991) employed a supply-chain perspective to identify a set of eleven procurement activities that are applicable to the purchase of goods and services in industrial markets. Heckman (1999) presented a process model of IT procurement by drawing on a group of senior managers on IT procurement. Krouse (1999) proposed eight key steps in the procurement process to help healthcare organizations benefit from their hardware and software purchases. Rajagopal and Bernard (1993) proposed an integrated procurement strategy that is divided into three phases, information gathering, identification and integration, and communication and implementation.

The proposed framework comprises of eight fundamental processes that are primary activities for the acquisition of goods and services. These eight basic procurement processes are planning, design, identification, selection, negotiation, ordering, fulfillment, and use/maintain/dispose. These activities are supported by a set of five procurement support processes that span all of the primary activities and facilitate their completion. These support processes are technology infrastructure integration, information/knowledge repository management, procurement business process redesign, commerce management, and collaborative procurement management. Heckman (1999) proposed a similar model for IT procurement with a set of deployment processes – requirements determination, acquisition, and contract fulfillment, as well as management processes – supplier, IT asset, and quality management. Managerial empiricism also suggests that many enterprises commonly employ the proposed processes into their vocabulary when defining and describing their procurement activities. Figure 1 illustrates the proposed business process procurement model.

Figure 1. The Procurement Business Process Value Chain Model



PRIMARY PROCUREMENT PROCESSES

There are eight procurement processes that serve as the primary components of the acquisition of goods and services. The primary procurement processes are better illustrated by an example of an enterprise aiming to build a completely new product from scratch. Since the company has not made all decisions about the product, the planning about component sourcing is the first priority. Moreover, the product design may not be completed, requiring a design process. After deciding the products and services to be purchased, the buyer needs to identify and select suppliers. In addition, a negotiation process is needed to agree upon the ordering terms. Following ordering, the products need to be handled, delivered, and accounted for, a process termed fulfillment. Finally, the products and services are used, maintained, and disposed.

i. Planning

Organizations are faced with increasing levels of competition, product complexity, rising input costs, and rapidly changing technologies. Therefore, procurement requires more forecasting and planning, improved decision-making, and active development of purchasing strategies (Burt and Sukoup 1989, Carter and Narasimhan 1996; Ferguson, Hartley, Turner, and Pierce 1996). The foremost stage in any procurement process is to identify a need by an organization and take steps toward defining and evaluating this requirement and make decisions toward satisfying this need. The planning process is defined as the process of determining an organization’s needs, requirements, and approval decisions to proceed with the acquisition of specific goods and

services. The planning process is an activity where buyers collect, interpret, understand, and respond to their organization's needs. The planning process comprises of sub-processes such as:

- Identifying and evaluating a business requirement.
- Gathering information and evaluating alternative solutions.
- Performing cost-benefit analysis and make-or-buy decisions.
- Gaining expenditure approval.
- Generating acquisition plans.

The importance of the planning process is fundamental to any procurement effort. Effective planning assures that the exact needs are identified and refined, and reliable analyses are performed to reach acceptable solutions. Better planning reduces uncertainty in the supply chain and the need for large inventories. It also achieves higher capacity-utilization levels, more efficient and accurate matching with actual organizational needs, lower inventory costs, and lower shipping costs that eliminates the need for rush orders and expedited shipping.

ii. Design

The second stage in the procurement process is usually the design process where the product prototype is conceived, devised, and created. The magnitude of product design as a fundamental aspect of procurement has recently emerged. This process is typical for complex procurement decisions and new products where the focal manufactured good requires extensive fabrication, prototyping and development; however, in basic procurement this process may be trivial. The design process may be a collaborative activity that includes several people from within and outside the organization. The planning process comprises of sub-processes such as:

- Defining and evaluating user demands.
- Integrating people and technology to review initial plans.
- Revising model workflows.
- Improve existing products.
- Assure that the final design accurately captures and complies with user requirements.

The importance of the design process is vital to any complex procurement effort because it helps bring better products to market, more quickly and with lower costs. An effective design process increases procurement efficiency, improves product development, increases speed time-to-market, reduces costs, and helps deliver high-quality products on time and on budget.

iii. Identification

The identification process is the process where buyer organizations identify suppliers and products that are likely to satisfy their procurement needs based on the organization's procurement plans and product designs. The basic sub-processes of the identification process are:

- Obtaining information on supplier availability and preferred suppliers.

- Identifying all possible suppliers that are able to satisfy the procurement need.
- Learning about product availability.
- Understanding market conditions by conducting appropriate market analysis.
- Searching for suitable products.
- Collecting information on purchasing and qualified suppliers.
- Engaging new suppliers, if necessary.
- Developing a short list of suitable suppliers.

The identification process is an important step of the procurement process because it provides critical information on market conditions and supplier and product availability. While the planning process gives some information on how user requirements could be satisfied, the identification process gives specific knowledge based on actual market conditions, the power/dependence balance, and the most effective purchase type (Novack and Simco 1991). This process is a decisive prerequisite to a favorable supplier selection since the pool of possible suppliers should contain those that are most likely to satisfy user requirements.

iv. Selection

The selection process is defined as the process of evaluating and selecting appropriate suppliers for satisfying procurement needs. In order to make the best possible selection based on the availability of suppliers, product sourcing, and other pertinent terms, buyers should engage in the following sub-processes:

- Initiating communication links and information sharing with the identified suppliers.
- Analyzing supplier responses and communication.
- Reviewing contract terms and proposals.
- Evaluating the remaining supplier base.
- Matching the supplier base with the buyer requirements.
- Selecting the most suitable suppliers.

Supplier selection can also be reached by competitive bidding, auctions, and negotiation. Since the selection process ultimately chooses the supplier and corresponding goods and services, its importance for the procurement process is crucial.

v. Negotiation

The negotiation process is defined as the process of identifying and facilitating the give and take of monetary and non-monetary variables such as price, shipping time, product quality, and other pertinent information between the buyers and suppliers. The negotiation process involves the following sub-processes:

- Developing a preliminary negotiation approach.
- Generating formal negotiation strategies.

- Engaging in actual legal contract negotiation.
- Identifying the value-added from the negotiation.

The negotiation process is usually structured for the procurement of commodity products, whereas an unstructured and involved process is typical for complex procurement. Since the negotiation process essentially determines the contract terms such as price, quality, and time, it is critical for successful procurement.

vi. Ordering

The ordering or execution process is defined as the process of submitting a purchase request for the required products and services. The ordering process usually consists of these sub-processes:

- Requesting quotations through RFQs or other quotation techniques.
- Initiating forward or reverse auctions.
- Appointing dynamic or static pricing and bidding models.

The ordering process may also be a collaborative activity where buyers and suppliers agree on a purchase order based on price, quantity, and delivery terms.

vii. Fulfillment

The fulfillment process is defined as the process of managing and coordinating activities involved in implementing contract requirements (Heckman 1999). The fulfillment process may be a time-consuming process that includes product delivery, installation, implementation, and support, as well as post-purchase performance evaluation. Therefore, the importance of the fulfillment process for efficient and effective e-procurement has been widely touted (refs).

Following Heckman (1999), we isolate a set of basic fulfillment sub-processes such as:

- Expediting orders.
- Accepting products and services.
- Handling logistics, returns, product installation, and contract administration.
- Processing invoices and payments.
- Resolving problems, post-installation services, and quality maintenance.
- Managing transportation activities (shipments, booking, rating, routing, and compliance).
- Administering delivery, tracking, returns, and backordering.

viii. Use, Maintain, Dispose

The final process in any procurement activity is the use, maintenance, and ultimate disposal of the procured product and service. The use/maintain/dispose process is defined as the process of enhancing the deployment of all purchased products and services throughout their life cycle

toward meeting the initial business requirements. This process aims to utilize all acquisitions effectively by:

- Developing asset maintenance strategies.
- Tracking the product inventory.
- Maintaining utilization records
- Disposing exhausted goods effectively.

These processes are often collaborative since buyers and suppliers need to jointly resolve post-purchase problems such as returns, scheduled maintenance, post-installation services, disposal of excess or obsolete assets, and maintenance of quality records.

SUPPORT PROCUREMENT PROCESSES

While the previous eight procurement processes are the basic building blocks of any procurement effort, several other complementary processes are typically involved to improve the entire procurement activity. The support procurement processes are defined as the processes of assuring continuous improvements in all primary processes. These support processes are not involved in particular purchasing events, but they are generalized foundation processes that aim to recurrently enhance the procurement process. The proposed five processes are technology infrastructure integration, information/knowledge repository management, procurement business process redesign, commerce management and collaborative procurement management.

i. Technology Infrastructure Integration

Technology infrastructure integration is defined as the process of combining all basic procurement processes with a seamlessly integrated technology platform. The infrastructure integration process spreads across all primary procurement processes by providing the technology support to link the individual procurement processes and simultaneously improve them individually and in aggregate. The integration process also extends to combining the buyer's processes with the suppliers' systems. The basic sub-processes of the technology infrastructure integration process are:

- Integrating the individual primary procurement processes into an uninterrupted sequence.
- Combining major applications, databases, legacy systems, and people involved in the primary procurement processes.
- Connecting the processes of buyers and suppliers into a common infrastructure.
- Linking diverse applications installed within and outside the organization.
- Facilitating a buyer-supplier infrastructure for communication and collaboration.

ii. Information/Knowledge Repository Management

Information/knowledge repository management is the process of forming, updating, and maintaining a repository of relevant procurement information and knowledge that can enhance the procurement process. This repository management process includes a set of sub-processes such as:

- Storing useful product and supplier information.
- Delivering a searchable product and supplier database and cross-referencing when needed.
- Providing an easy access to relevant knowledge and information.
- Generating real-time updates to purchases, inventory, and logistic data.
- Centralizing information and knowledge that can be used by multiple departments within the organization.

An information/knowledge repository is a key factor in supporting the procurement process since it facilitates virtually all procurement activities. Better information is associated with effective planning, while more knowledge in product design leads to product development. A repository of supplier and product information is crucial in identifying competent suppliers and choosing the most appropriate ones. Proper information management can also lead to better negotiation outcomes and more favorable contract terms. Finally, a knowledge repository is integral in facilitating the fulfillment process and proper usage, maintenance, and disposal of a purchased asset. In sum, the information/knowledge repository management process spreads throughout the procurement process and improves purchasing practices.

iii. Procurement Business Process Redesign

The procurement process, as most business processes, is generally independent of organizational structure; this has led to a recent focus on business process redesign (BPR), where important business processes are redesigned to increase their efficiency and effectiveness. As with any business process, the procurement process is also subject to continuous improvement through BPR. The basic elements of the procurement business process redesign are:

Commerce Management

The commerce management process is defined as the process of authenticating products and optimizing supplier relationships to sustain and improve commerce activities. Following Heckman (1999), the basic elements of the commerce management process for procurement are:

- Verifying the quality and features of the products offered.
- Authenticating and qualifying suppliers.
- Establishing a relationship portfolio strategy.
- Classifying suppliers based on their importance to the organization.
- Communicating supplier performance expectations.

- Evaluating supplier performance.
- Providing feedback on performance metrics.
- Assessing supplier qualification.
- Ensuring relationship roles and responsibilities.
- Engaging in dynamic information sharing.

The supplier management process supports the procurement process by improving supplier relationships, defining and enhancing supplier performance metrics, conducting quality reviews for the purchased products, evaluating suppliers' capabilities, and working with suppliers to improve product quality and performance.

v. Collaborative Procurement Management

The collaborative procurement management process is defined as the process of enhancing collaboration with suppliers and partners during the procurement activities. This process is associated with joint planning, collaborative product design, and cooperative negotiation. According to Roche (2001), in order to take full advantage of e-procurement investments, companies must enable truly collaborative relationships with the suppliers. Collaborative procurement management includes sub-processes such as:

- Coordinating joint action during the fulfillment process.
- Resolving purchase problems toward common learning.
- Handling product returns and backordering in cooperation.
- Maintaining quality records toward mutually beneficial outcomes.
- Administering product installation, use, maintenance, and disposal.

The importance of collaboration in buyer-supplier relationships has become a fundamental source of procurement value. Therefore, the collaborative procurement management process can add value by enhancing the individual procurement activities through collaboration.

IT-ENABLED SERVICES AROUND THE PROCUREMENT PROCESS

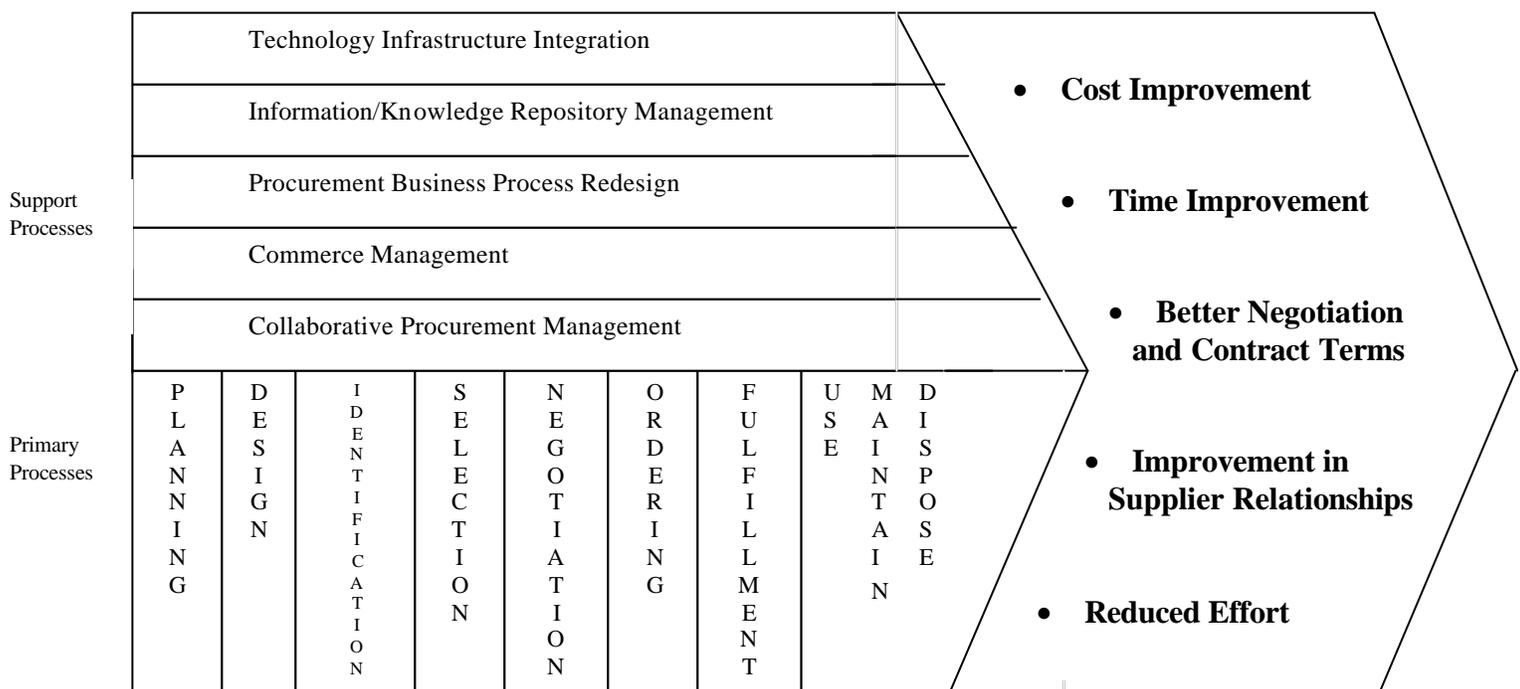
A service has been defined as a package of explicit and implicit benefits performed within a supporting facility and using facilitating goods (Fitzsimmons and Sullivan 1982). The service package is defined by a bundle of goods and services consisting of (a) supporting facility, (b) facilitating goods, (c) explicit services, (d) implicit services. In the context of B2B exchange organizations, the supporting facility refers to the virtual platform (website, servers, infrastructure, etc.) that must be in place as a point of contact. The facilitating goods are the materials purchased or consumed such as the software packages and tools, customer support, and other resources provided. Explicit services refer to observable benefits (efficiency, value) obtained in the procurement process. Implicit services refer to psychological benefits (satisfaction, hassle-free procurement) that may be abstractedly sensed by participating enterprises.

According to Sculley and Woods (2000), B2B exchange organizations can provide procurement value by providing an integral set of services around procurement. In fact, Cross (2001) argues that B2B exchange organizations must provide industry-specific services in order to survive. However, there is an intrinsic difficulty in measuring the outcome of IT-enabled services around the procurement process since the value-added effect may take different forms. Fitzsimmons and Sullivan (1982) argued for a definitive evaluation of service performance by measuring the change from input to output state, a process known as transactional analysis. Despite the intrinsic difficulty in quantifying the value-added from services, there are several examples where the provision of services creates value by improving procurement outcomes such as:

- **Cost improvement** by reducing inventory, freight, and administrative costs, receiving competitive market prices, shrinking expenses associated with paperwork, postage, printing, travel, telecom, and courier deliveries.
- **Time improvement** by reducing negotiation time, faster access to applications and application data, accelerated business practices, quicker project time to market or time to completion, and easier ways to initiate communication links with multiple suppliers.
- **Better negotiation and contract terms** by understanding global market trends, accessing market prices quickly and efficiently, having immediate and accurate snapshot of current market conditions, and capturing and leveraging knowledge across a global supplier reach.
- **Improvement in supplier relationships** by standardized and streamlined communication and collaboration capabilities, better tools to cooperatively manage projects, and instant identification of suppliers that have the required goods.
- **Reduced effort** by easier software acquisition, integration and deployment, standardized data sharing and transfer, streamlined backend operations, and higher efficiency of team resources and project productivity.

Figure 2 graphically illustrates the dimensions of procurement value.

Figure 2. Sources of Value in the Procurement Process



SERVICES AROUND PRIMARY PROCUREMENT PROCESSES

i. Planning Services

Planning services are forecasting tools that aim to improve the planning process by improving decision-making and developing optimum purchasing strategies. These services allow buyers participating in B2B exchange organizations to:

- Collect, interpret, and respond to real-time demand information.
- Create, update and query data and perform advanced analysis and reporting.
- Consolidate information to accurately plan and forecast sales cycles and assess distribution strategies and supply requirements.
- Monitor real-time options based on historical trends and past performance to resolve inventory excesses or shortages.
- Receive real-time alerts and other tools for active planning strategies.
- Share critical information such as inventory levels, usage history and patterns, approval routing, and in-transit inventories.
- Access real-time information to monitor consumption levels in order to respond quickly and efficiently to any changes.
- Conduct simulations and “what-if” analysis.
- Gain global visibility into the order history, claim resolution, product specifications, pricing, and historical performance.
- Collaborate with suppliers on jointly planning future needs.

Planning services create procurement value mainly by better evaluating organizational requirements and forecasting future needs. This reduces the costs of purchasing incorrect products and quantities, having excess inventories or suffering product shortages, and improperly predicting procurement needs. Planning services also reduce the time and effort required to assess the organization’s needs, collect and analyze information, and conduct forecasting analyses. By employing planning services, organizations can gain value by obtaining favorable contract terms by purchasing at the right time based on historical data. Finally, value can be gained by enhanced supplier relationships following joint planning activities.

ii. Design Services

Design services are provided through a design environment that enables the integration of people and technology, aiming toward superior and more efficient design process. Enterprises spend substantial resources to develop and introduce innovative new products. In order to meet the constantly changing customer needs for quality, originality, and price, the design must be performed faster, at lower cost, and with a great deal of creativity. Therefore, IT-enabled services have been introduced in B2B exchanges as superior product-innovation capabilities to facilitate and add value to the design process. Design services enable buyer enterprises to:

- Enable a fast design platform where original design reviews and revisions can occur in real time, and with complete visibility by all relevant parties.
- Facilitate a collaborative design environment that helps bring better products to market.
- Facilitate administrative activities such as approval and routing of new designs.
- Provide drawing tools that add value and efficiency from the concept and design to the prototyping and development.
- Enable project management services such as project tracking, design reporting and metrics, and document management tools,
- Facilitate private workspaces such as action item tracking,
- Enable unstructured and structured collaboration services such as design reviews for reliability, and availability, phase reviews, product visualization and markup, meeting management, and workflow modeling.
- Enhance integration among partners in a secure environment.

For example, Covisint (www.covisint.com) Virtual Project Workspace acts as a set of design services by providing an information and communications management platform for interorganizational product development teams. These services enable more efficient and accurate decision making by allowing team members to collaborate, share project-specific knowledge, participate in virtual meetings, and automate the entire design process.

The value-added components of design services are (a) increased speed to market by automating the design process and helping designers interact more efficiently, (b) cost reduction by providing more efficient tools and facilitating virtual workspaces and meetings, and (c) improved new product development by facilitating interactive collaboration that is likely to reveal innovative and high-quality products on time and on budget (Moorman and Miner 1995). Converge (www.converge.com) estimates that their design services will help its customers not only to get a product to market 10% faster, but also to reduce total cost to market of which 80% is incurred during the design process.

iii. Identification Services

Identification services help buyer enterprises identify suppliers and products that are likely to satisfy their procurement needs and distinguish those that are more likely to better satisfy their needs. B2B exchange organizations facilitate the identification process by:

- Providing information on supplier availability, information on preferred and existing suppliers, product availability, and ability to engage new suppliers.
- Enabling intelligent search engines for products and suppliers.
- Offering access to online product catalogs to search and browse for products.
- Providing access to new suppliers, products, and competitive pricing around the world.
- Consolidating product specifications and product descriptions.

- Searching for new suppliers quickly, identify alternate suppliers who are qualified to satisfy specific procurement needs, and engage new suppliers quickly.
- Providing supplier accreditation and historical information for multiple suppliers around the globe.
- Issuing Requests for Quotation (RFQ) to multiple suppliers automatically and allow the identified suppliers to submit quotes directly.
- Providing professional services with global sourcing experience to help buyer organizations satisfy their procurement needs.

Identification services create value to the procurement process along several ways. First, these services increase the likelihood of finding the right products and services and avoid shortage costs. Second, automating and facilitating the identification process reduce the time and efforts required to search and identify products and suppliers. By increasing a buyer's reach to a broader array of qualified suppliers, the buyer's bargaining power and supplier competition increases, making it likely to receive favorable procurement terms. Moreover, buyer organizations are likely to meet and establish new trade relationships with new suppliers that are likely to satisfy their needs better. Finally, identification services reduce procurement risk by identifying prequalified and accredited products and suppliers.

iv. Selection Services

Selection services help buyers make the best possible selection for their procurement needs based on the availability of suppliers, products, and other pertinent terms. Selection services in B2B exchange organizations enable buyers to:

- Receive rich information on products and services by electronically assembling communicating, and responding to virtually any type of sourcing requirement with Requests for Information (RFI)
- Establish communication links with multiple potential suppliers.
- Allow suppliers to respond with flexible quotes.
- Provide tools to compare and analyze supplier offers such as comparison worksheets that are created automatically as supplier quotes are received.
- Enhance bid process competition among suppliers.
- Automatically issue purchase orders to selected suppliers.

Selection services create value to the procurement process by assisting the buyers' decision making and helping them select the most appropriate suppliers. This suggests that buyers receive the most competitive contract terms in terms of price, quality, and other pertinent terms. Moreover, these services automate the selection process, reducing the time and effort required to reach optimal decisions.

v. Negotiation Services

Negotiation services help buyers and suppliers bargain and agree on legal contract terms. For example, Envera (www.envera.com) concentrates on supporting the negotiation processes between partners that already have existing contracts. IT-enabled negotiation services are able to:

- Aggregate demand to increase negotiating power and lower the cost of goods.
- Facilitate the negotiation of both monetary and non-monetary trade variables such as price, shipping time, product quantity, and other pertinent variables.
- Enable structured negotiation services that are more appropriate for commodity products and unstructured negotiation tools that are more applicable complex sourcing.
- Encompass both negotiable and non-negotiable offers into anonymous or non-anonymous negotiations.
- Document an automatic record of all negotiations to eliminate future misunderstandings.
- Facilitate private online negotiations with preferred suppliers.
- Organize one-to-many negotiation schemes by bringing all selected suppliers simultaneously.

The value-added component of negotiation services is time reduction that allows faster and more efficient negotiations. By allowing simultaneous negotiation of several trade variables and with multiple suppliers, the negotiation process becomes faster, easier, and more effective. In addition, by aggregating demand, buyers have better chances of obtaining more favorable contract terms. Finally, the different negotiation structures are able to mitigate ambiguity and confusion in the procurement process and reduce the effort required to negotiate.

vi. Ordering Services

Ordering services enable buyers to initiate the product ordering process and execute purchase invoices. Ordering services enable buyers to:

- Employ multiple methods of accessing and sending order information to their suppliers.
- Submit RFQs to source, generate competitive offers, and produce invoices.
- Participate in forward and reverse auctions that may be either public or private events.
- Enable online collaboration on price, quantity, and delivery with selected suppliers.
- Send, acknowledge, alter, or cancel electronic purchase orders and invoices.
- Provide order management tools such as status reporting, order requisition, order submittal, change orders, etc. to create intelligent purchase orders.
- Assure that every transaction is secure, with data sets protected and restricted to authorize suppliers.
- Create purchase orders with complete security control at the individual document level.
- Sign electronic contracts with suppliers digitally.

Ordering services create value in the procurement process by reducing inefficiencies and errors in the execution process and by facilitating fast, secure, and reliable electronic transactions.

These services automate the paper-intensive ordering process and reduce the time, effort, and cost of tracking down paperwork. By digitizing the ordering process, an electronic record is automatically created that facilitates future order executions.

vii. Fulfillment Services

Fulfillment services provide efficiencies into the execution and product delivery phase, enhancing procurement through optimization of the entire fulfillment and implementation process. These services allow buyers to:

- Perform automated management of the complete logistics process, permitting fewer delays, requiring less expediting, reducing logistics costs, and maintaining and improving service rates.
- Receive integrated transportation management services that provide full visibility to all shipments and automated tracking of shipment performance.
- Gain visibility in shipments to effectively control all aspects of logistics such as booking, rating, routing, and compliance, and optimization of shipments through analysis of shipping patterns.
- Gain real-time visibility into actual demand and supply across the supply chain.
- Allow centralized contract management and easy identification of improvement opportunities.
- Share shipping plans with logistics providers, and generate and transmit shipping notices to suppliers.
- Receive online transportation solutions that manage and optimize shipping across all modes of transportation.
- Create efficient load planning, increase on-time performance, and track and trace loads.
- Receive project management applications to supervise the entire fulfillment process.

The value-added components of fulfillment services are (a) increased delivery speed by automating the execution and fulfillment process, (b) cost and time reduction by providing more effective logistics, transportation, and shipping solutions, and (c), mitigate ambiguity and confusion in the fulfillment process by allowing improved scheduling and visibility across the entire process.

viii. Use/Maintain/Dispose Services

The use, maintenance, and disposal services help buyers take full advantage of whatever products and services they purchase throughout their entire life. According to Mehra (2000), most B2B exchanges handle processing returns or dealing with damaged merchandise poorly. Therefore, use/maintain/dispose services have great potential to improve the final part of the procurement process. These services allow buyers to:

- Develop superior use and maintenance strategies by tracking, monitoring, and evaluating products and related services.

- Implement databases, systems, and tools to control product inventory.
- Employ tools to sustain utilization records, life-cycle management, compliance monitoring, configuration planning, redeployment planning, product maintenance, and lease and agreement management.
- Communicate best practices for using and maintaining products throughout the organization.
- Dispose goods effectively by matching the inventory against buyers needs.

Even if the use/maintain/dispose services succeed direct procurement services, there is a great amount of value to be gained by effectively utilizing an organization's acquisitions. These services help productivity improvement by taking advantage of the full potential of products and services. Moreover, usage information could indirectly help future planning by gaining knowledge on the performance and reliability of purchased assets. Finally, dispose services provide cost improvements by allowing buyers to sell their overstock inventory faster, easier, and at better prices.

SERVICES AROUND SUPPORT PROCUREMENT PROCESSES

i. Technology Infrastructure Integration Services

Beyond the services around primary processes that mainly aim to improve the commerce phase, there are possibilities to fundamentally improve the overall procurement execution. Technology infrastructure integration services help buyers to combine all basic procurement processes with an integrated technology platform that enables companies to communicate, transact, and collaborate with their suppliers. For example, Envera (www.envera.com) allows companies to build an infrastructure for point-to-point connections with ERP systems of their partners, allowing electronic integration between buyers and suppliers. The ultimate goal of technology infrastructure integration services is to provide a technology platform for rapid system integration to facilitate buyer-supplier communication, transaction, and cooperation with guaranteed information distribution, transaction security and reliability, data archiving, collaborative procurement processes, and non-repudiation. For example, these services can be integrated into the buyers' back-end systems, providing inventory and supply-chain information among buyers and suppliers. Several technology infrastructure integration services provided by B2B exchange organizations are described below along with several illustrations. These services allow buyers to:

- Bring their existing and new suppliers together using a single standardized, flexible, and open technology architecture. For instance, all documents and data received into the Covisint (www.covisint.com) Supply-Connect system are translated into a standard version of XML to facilitate direct communications between trading partners.
- Create an infrastructure to support all procurement processes through an automated connection to the organization's internal ERP systems or through a web browser interface.
- Integrate their back-end systems and connect their internal systems and the distributed systems with their supply network members. For instance, Converge

(www.converge.com) has helped HP develop a technology infrastructure that allows integration with ERP systems of its partner companies.

- Receive professional and integration development services to determine customized solutions and estimate resource requirements for specific procurement needs. For example, e-STEEL (www.e-steel.com) ConnectSM services allow buyers to integrate at various levels from a simple online interface to a complex business process integration depending on their business needs.
- Ensure that software installations and applications run smoothly and troubleshoot problems in client workstations, networks, servers, and firewalls whenever they occur.

By blurring corporate boundaries and providing the technological capabilities to integrate business processes and exchange information, buyers can operate more efficiently, reduce costs, increase revenues and working capital, and gain a competitive advantage. The value-added effect of integration services is the ability to manage business processes across the entire extended enterprise, unbounded by the limits of conventional integration tools. Examples of the value associated with the technology infrastructure integration process are comprehensive procurement performance tracking, enhancements in buyer-supplier communication, and improvements in joint designs, forecasting, fulfillment, and identification of new improvement opportunities.

ii. Information/Knowledge Repository Management Services

Information/knowledge repository management services form, update, and maintain a repository of relevant procurement information and knowledge that can improve all parts of the procurement process. According to Roche (2001), some of the richest service offerings by B2B exchange organizations will facilitate the exchange of ideas as value-added services. Several repository management services are described below along with some illustrating examples. These business intelligence services allow buyers to:

- Provide content management such as (a) detailed commercial descriptions of products and services, (b) technical attributes of a product that describe its appropriateness for a given function, and (c) an assembled base of intellectual property that provides significant perspective on design, procurement and other business processes. For instance, Enermetrix (www.enermetrix.com), a B2B exchange organization in the energy industry, offers the BuyerMetrix database that manages detailed information about local utilities, rates and tariffs, and energy delivery points. Other information includes historical energy consumption, historical energy costs, costs break down by local utility and third-party supplier, and supplier credit information.
- Generate a wealth of information that can be aggregated and data-mined for delivering real-time accessible information on suppliers, components, datasheets, and life-cycle specifications. For example, Converge (www.converge.com) built a transaction data repository to help HP attack inefficiencies by integrating information on all its suppliers rather than one-by-one (Industry Week 2001, p. 32).
- Enable quick access to datasheets, real-time pricing information, message brokering B2B integration tools, and end-of-life reports.

- Provide an overview of trading activity that can be personalized to focus on just the products and services.
- Share relevant information with their suppliers. For example, Supply-Connect serves as the communications hub for the Covisint (www.covisint.com) automotive B2B exchange. This hub allows organizations to quickly share critical information, such as material releases, production schedules and shipping notices.

The basic value-added aspect of information/knowledge repository services is to create a knowledge database where buyers can locate and share information that would lead to faster and more effective business decisions. Since wealth of relevant information has been associated with improved decision-making, repository management services could leverage collaborative procurement processes, reduce inventory levels and procurement costs, and reduce product design costs and time to market.

iii. Procurement Business Process Redesign Services

Forrester Research recognized that the problem of many B2B exchange organizations is their focus on automating existing procurement processing instead of leveraging Internet technologies to completely redesign business processes (Pekala 2000). Procurement business process redesign services are used to improve the existing procurement process by identifying problematic sub-processed and redesigning them. B2B exchange organizations may provide professional consulting and implementation services that:

- Identify specific needs throughout the procurement process and collaborate with the buyers' business and IT staff to design, develop, and implement the procurement business process redesign solution.
- Recommend solutions, provide training during implementation, and monitor the project timeline and budget.
- Provide experience and specialized know-how to meet business process integration requirements quickly and cost effectively.
- Allow buyers to monitor their business processes for real-time access to mission-critical performance and error information.
- Optimize process performance, further refine the procurement processes, and dynamically respond to changing business requirements.

As with most business process redesign efforts, procurement process redesign can create value by enhancing the procurement process and allow better integration of the individual processes.

iv. Commerce Management Services

Commerce management services help optimize buyer-supplier relationships and authenticate products to add value to the procurement effort. According to the Aberdeen Group (www.aberdeen.com), effective B2B exchange organizations would use technology to restructure business relationships and eliminate unnecessary participants from the supply chain (Pekala

2000). Moreover, a B2B exchange organization could also have an authority role, setting and promoting trade rules and regulations, qualifying products and suppliers, resolving disputes between buyers and suppliers, and advancing hassle-free day-to-day procurement processes. In contrast to collaborative management services, supplier management services are mainly employed to facilitate sporadic, non-collaborative buyer-supplier relationships. Therefore, the main sub-processes are to:

- Approve and qualify suppliers by checking credit and payment history, helping buyers to trade with confidence.
- Check the quality of products and services to meet agreed-upon specifications.
- Monitor economic activity to assure that all transactions take place in accordance with the contract terms.
- Enable feedback mechanisms where buyers can publicize their past trading activities.
- Offer matching solutions for identifying and qualifying business partners that are likely to best satisfy recurring procurement needs.
- Consolidate supplier issues to manage prioritization of supplier enhancement requests.
- Accumulate supplier feedback to assist product enhancements and future functionality.
- Encourage and facilitate dialogue among buyers and suppliers.
- Manage and coordinate activities with selected suppliers toward improving buyer-supplier relationships and finding ways to enhance the procurement supply chain.

Commerce management services help buyers improve their occasional and new supplier relationships; hence, the focus is to help buyers accelerate online procurement deals by establishing a basic level of reciprocity and trust toward supplier organizations. Supplier accreditation reduces the time, cost, and effort to screen qualified sellers and products, while monitoring reduces transaction-specific risks. Commerce management services also assist procurement improvement by accumulating feedback from other participating enterprises.

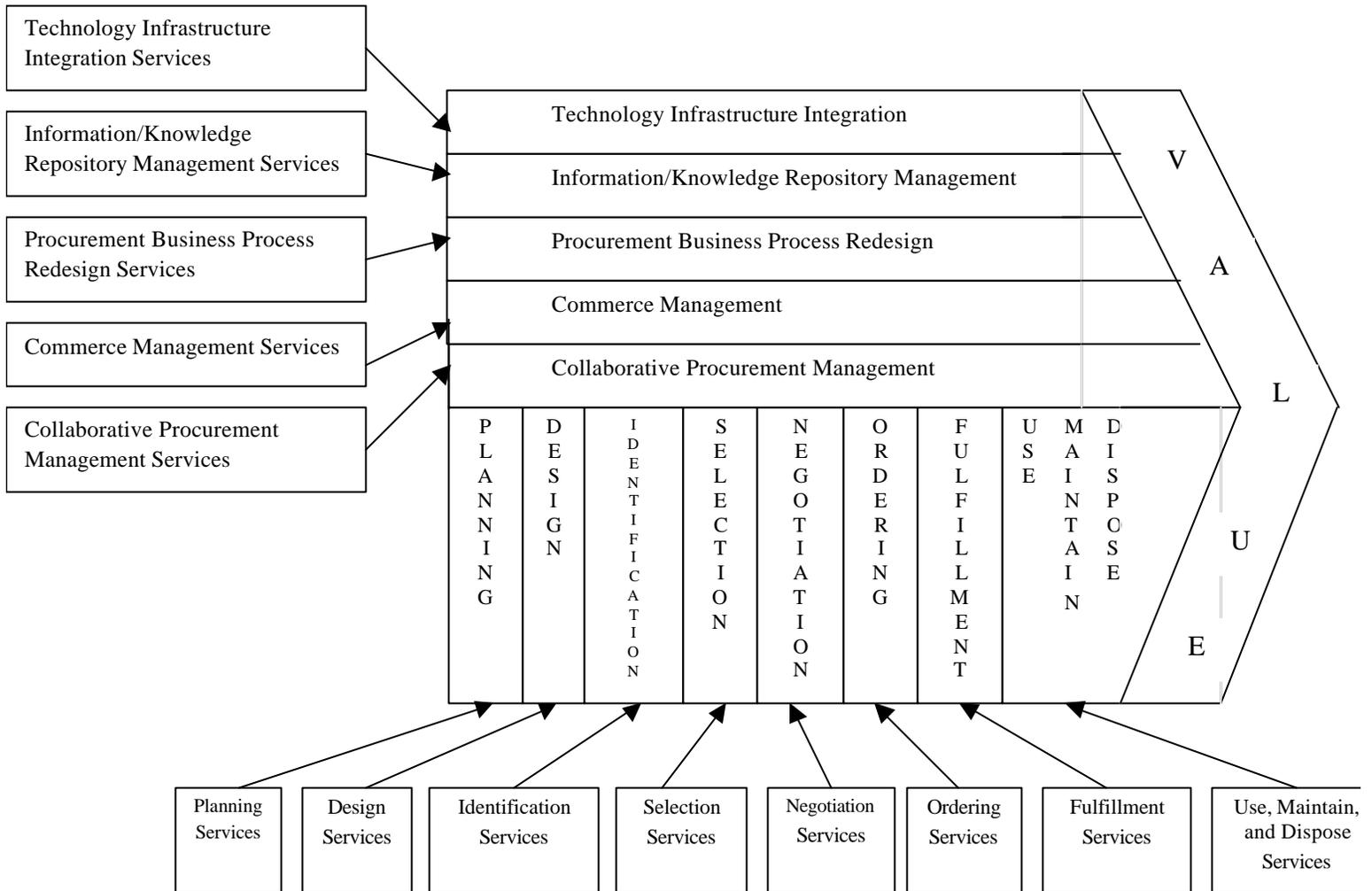
v. Collaborative Procurement Management Services

As B2B exchange organizations develop the infrastructure to integrate buyers and suppliers, they have the ability to provide collaborative services in the procurement process. According to Malloni (Industry Week 2001, p. 24), the ultimate advantage from B2B exchanges would be to provide services that increase buyer-supplier relationships such as design collaboration services. Forrester Research (www.forrester.com) argues that enterprises should look to new dynamic-collaboration services that reduce redundant activities and efficiently connect buyers to their network partners. Other areas where collaborative services can enhance buyer-supplier relationships are in the areas of product development, marketing, supply chain, and operations. For example, buyers could collaborate with their suppliers, aiming to improve development ideas and the procurement process, thus allowing them to take full advantage of their supplier relationships (Mehra 2000). For example, support services such as product development collaboration could bring together engineering resources of buyers and suppliers to create powerful design teams. Collaboration services enable buyers to:

- Develop production plans and schedules collaboratively and spot exception conditions proactively.
- Provide access to project materials and communications, such as design drawings and specifications, in a secure online environment.
- Optimize designs by providing information on sourcing and supply constraints.
- Allow entire project teams to share and collaborate on project related documents.
- Facilitate the collaboration and communication between the buyer and seller associated with complex purchases of equipment, specialized materials, and services, including the sharing of design documents, drawings, and specifications.
- Enable project teams to collaborate internally on the creation and review of bid packages.
- Support strategic decision optimization and high velocity collaboration across the extended supply chain.
- Enable buyers and supplies to jointly define the optimal sourcing strategy to reduce risks and costs, and streamline the requisitioning products and services.

Collaborative procurement management services are able to support two-way communication between buyers and suppliers at each step of the procurement process. For example, when a shift in demand increases the need for goods or services, that information can be communicated to the supplier. Similarly, when low inventories affect the availability of a product, the supplier instantly communicates that news to the buyer. This improves the buyer-supplier relationship, and eliminates the costly surprises that can result from a lack of communication. Furthermore, there are substantial benefits from collaboration at each part of the procurement process from planning to fulfillment. These synergies can result in more efficient processes, lower risks, better and faster products to market, and more trustworthy trade relationships. Figure 3 graphically illustrates how IT-enabled services map to the procurement process value chain model.

Figure 3. Services around the Procurement Process



DESIGN QUESTIONS

This paper aims to address several design questions that a B2B exchange organization needs to consider in order to take full advantage of its IT-enabled services around e-procurement toward realizing value for its participating procurement enterprises. These questions take in account the issues of collaborative Vs competitive services, alignment of services with organizational characteristics, incremental Vs radical changes, and customized Vs standardized services.

Collaborative Vs Commerce Services

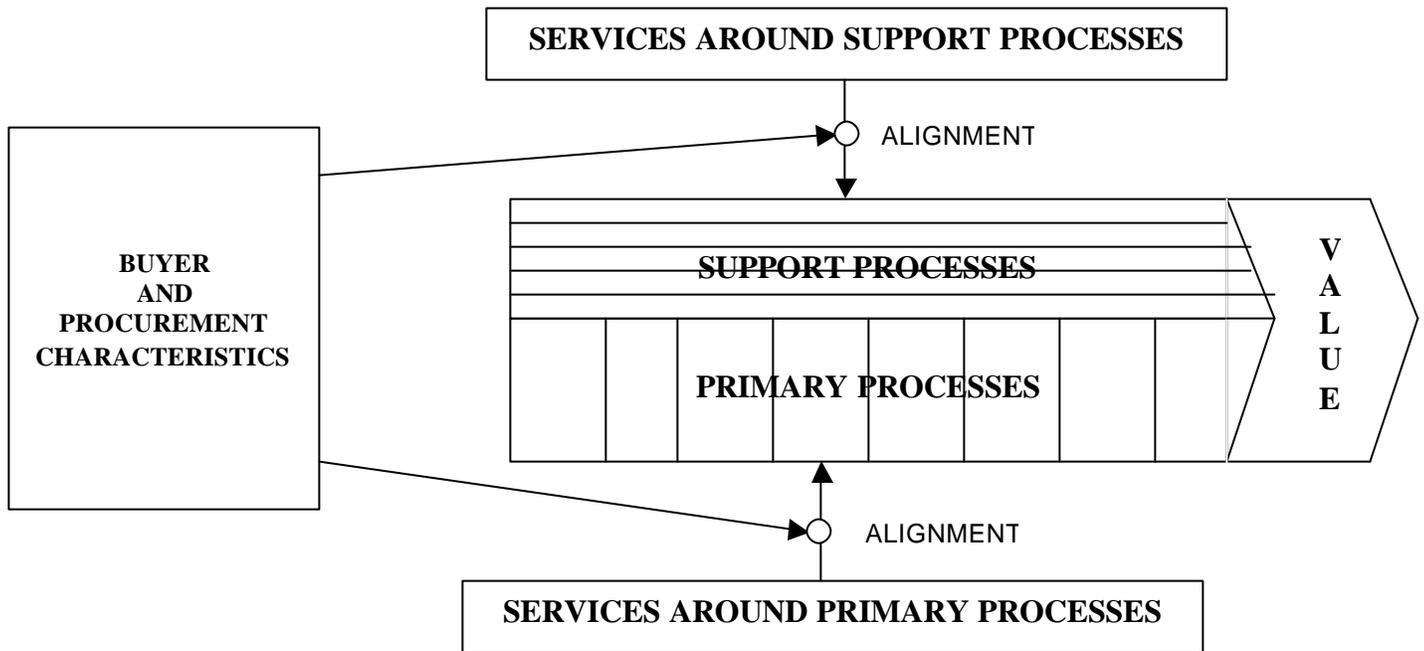
B2B exchanges were initially introduced as competitive or public marketplaces that mainly supported “at-arm’s-length” transactions, often between anonymous trading partners. Therefore, most services around procurement could be characterized as basic commerce services since they facilitated spot transactions in a global marketplace. The focus of commerce services is mainly cost reduction by removing inefficiencies in the supply chain. However, the importance of buyer-supplier collaboration has recently been widely touted, and many B2B exchange organizations rushed toward facilitating and encouraging services that facilitate close coordination between enterprises. For example, Chemconnect (www.chemconnect.com), a B2B exchange organization serving the chemical industry, offers basic commerce services around its exchange and commodity floors, whereas it offers private strategic services for its corporate trading rooms where large buyers transact with their preferred suppliers. Similarly, Billpoint (www.billpoint.com) recently changed its business model to be a private enterprise service provider, focusing on selected customers. The company aims not to be a public exchange but to build a collaborative network of companies. Therefore, an important issue that B2B exchange organizations need to address is the amalgamation of commerce and collaborative services around the procurement process. The proposed procurement process model covers both collaborative and commerce procurement services and can be employed to shed light on how B2B exchange organizations can create value by properly merging services around procurement.

Alignment between Enterprise Characteristics and Services

The service literature argues for an increasing customer participation in service operations as a means of enhancing productivity. The justification lies in the sense that customer involvement can improve system efficiency by taking advantage of the skills, abilities, and characteristics of customer organizations. A service system needs to interact with the customer input system in order to function properly. According to Fitzsimmons and Sullivan (1982), the quality of service is enhanced if the service package is designed from the consumer’s perspective and the consumer plays an active role in the service course of action. B2B exchange organizations can improve the quality of their procurement value offerings if their services are aligned with their buyers’ characteristics and idiosyncrasies. Drawing upon the proposed procurement process model, this paper discusses how services can align with the buyers’ needs to create value at each individual procurement process. Therefore, B2B exchange organizations need to consider how they can align their services with their participating organizations’ characteristics to realize maximum

value. Figure 5 gives a graphical representation of the importance of aligning services with the procurement process in order to achieve maximum value creation.

Figure 4. The Importance of Alignment in the Procurement Process



Incremental Vs Radical Changes

A B2B exchange is a relatively new phenomenon and their services are innovative and IT-intensive ways to improve the procurement process. Therefore, there is an issue of technology diffusion and adoption of innovation. Online B2B procurement may be viewed as a discontinuous innovation since it offers technological advances in the procurement process and requires changes in the ways buyers search for products, place and track orders, and communicate and collaborate with their suppliers during the process (Deeter-Schmelz, Bizzari, Graham, and Howdyshell 2001). Whereas the changes in the procurement facilitated by B2B exchange organizations may objectively be beneficial, there is a concern that attempting to change buyer behavior may find resistance by both buyers and suppliers. Therefore, B2B exchange organizations need to address the issue of providing incremental or radical changes through their procurement services.

Customized Vs Standardized Services

Another design issue that B2B exchange organizations face is the degree they facilitate customized as opposed to standardized services. While personalizing all service offerings to the

organization's specific needs could create a significant alignment and added value, the cost of customization may reduce the cost advantages of using these services. Therefore, standardization of all services to the degree possible might be a viable way to produce cost-effective services. In sum, B2B exchange organizations need to address the issue about the degree to which their services are customizable or standardized.

Drawing upon the proposed value chain view of the procurement process and the set of value-added services around each individual process, this research aims to shed light on the following design questions:

- 1. Which parts of the procurement process do B2B exchange organizations need to provide services around in order to provide a cost-effective way of realizing procurement value?**
- 2. What specific services does the B2B exchange organization need to provide around each part of the procurement process?**
- 3. Under what conditions is it beneficial for a B2B exchange organization to provide both collaborative and commerce services?**
- 4. How can a B2B exchange organization enhance process integration in the procurement process?**
- 5. What is the extent of change (incremental Vs radical) that a B2B exchange organization can expect to instill in the procurement process?**
- 6. What is the extent to which a B2B exchange organization should provide customizable (Vs standardized) services around the procurement process?**

INSIGHTS FROM SIX CASE STUDIES

Interpretive Case #1: Zeus³

Zeus is an independent online B2B exchange organization in the high-technology manufacturing industry that delivers collaborative and commerce services for improving the supply chain process for electronic components and other high-tech products and services. Zeus enables buyers and suppliers to access a secure website with specialized market information to connect, collaborate, and transact. While currently about 90% of Zeus's revenues come from transaction fees, the goal is to allocate revenues to 40% from offering collaborative services, 40% from transaction-based subscription fees, and 20% from consulting and software licensing services. Since the company maintains a transparency in their profit margins, it cannot engage in opportunistic pricing of rare components.

Zeus's business model focuses around mission-critical services for the high-tech manufacturing industry, instead of focusing on basic transactions. According to Business 2.0 (March 2001), Zeus insists that the greatest value would lie in services that streamline core business processes,

³ The name of the company is disguised for anonymity. The case-study is based on interviews with executives and managers, and other publicly-available information (e.g. websites, trade publications, press releases, etc.)

and especially on the collaborative design process. Zeus aims to provide a comprehensive and integrated suite of collaboration and commerce services in order to facilitate transactions and collaboration and deliver efficiencies in the high-tech supply chain management. For example, the company plans to facilitate collaborative trade, collaborative logistics, collaborative order management, and collaborative design services. Its most ambitious service is to provide a platform that helps engineers, suppliers, manufacturers, and customers collaborate on product designs. Moreover, Zeus continues to provide trade services to help buyers develop a procurement plan, find parts and suppliers, send orders and receive electronic components, and efficiently handle the fulfillment process.

Zeus offers services around six major procurement processes* :

- **Knowledge Management Services:** pricing information, industry news and resources, and product research.
- **Design Services:** Tools for a collaborative design platform, project management, private workspaces, and provisions for unstructured and structured collaboration.
- **Ordering Services:** Tools and services to collaborate with trading partners and facilitate ordering and transactions, auctions, and RFQ.
- **Negotiation Services:** Negotiation tools and services
- **Fulfillment Services:** Technologies to measure inventory in transit, measure in-hand inventory, and gain the 'ability to act' by gaining visibility in the inventory and current holdings. Also, services for logistics, fulfillment planning, transportation, and security.
- **Technology Platform Integration Services:** Supply chain enhancement, integration, certification, and guarantees.

a. Collaborative Vs Commerce Services

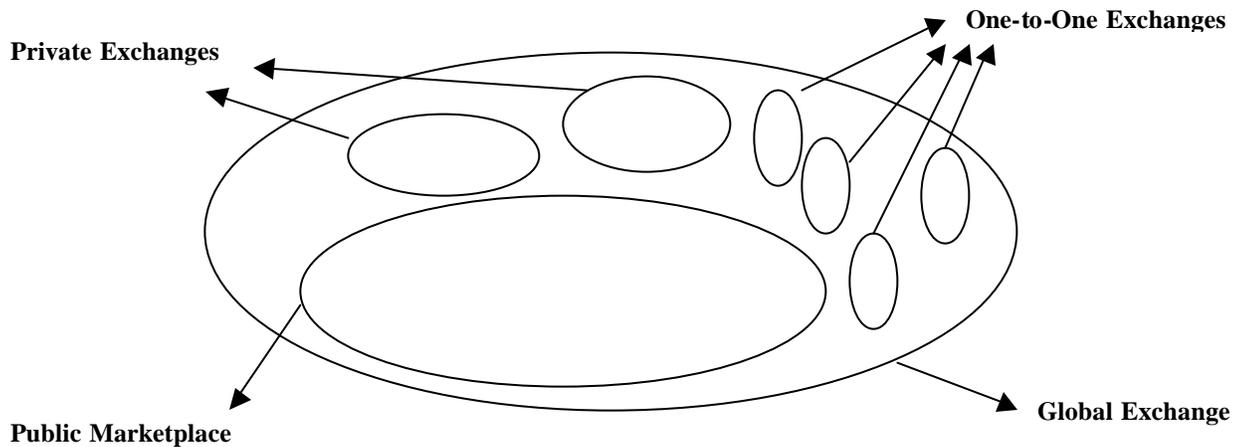
Even if Zeus distinguishes between collaborative and commerce services, the main aspect of the company's value proposition is to combine both types toward maximizing value creation, improving procurement performance, and establishing a competitive advantage over companies that fail to use its services. The company believes that the differentiation between public (commerce) and private (collaborative) exchanges is an oxymoron because these two types can be – and should be – combined together to create maximum value for buyer organizations. Within a single B2B exchange, there may be several transaction relationships (or supply webs). Depending on their particular procurement needs, buyers in the electronic components industry may choose to participate in either the public marketplace or in smaller private exchanges. In the public marketplace, many buyers may be able to satisfy their needs at lower costs. From this perspective, companies gain value mostly from commerce services, especially identification, selection, supplier management, and negotiation services. Additionally, companies may often select to participate in private exchanges with some of their trusted suppliers. In this transaction mode, enterprises can receive procurement value by using collaborative services such as collaborative design and collaborative management services. Some other services may create

* These services have been slightly adjusted to match our generalized typology of IT-enabled services.

value irrespective of the transaction mode, such as planning, fulfillment, and use/maintain/dispose services.

According to the description of an integrated B2B exchange organization such as Zeus, this figure emerged:

Figure 5. Representation of Combined Trade and Collaborative Services



The idea of this representation in Figure 3 is that under one umbrella (management) of a B2B exchange, it is feasible and cost-effective to have (a) a public marketplace with commerce services for basic transactions among all participants, (b) private exchanges with collaborative services for a few companies, usually driven by a large buyer, and (c) one-to-one collaborative dyadic relationships. These supply webs can harmonically co-exist and buyers can use either type depending on their particular procurement needs.

b. Collaborative Services

Collaborative services not only aim to provide immediate value to buyer organizations, but they are means to encourage greater collaboration in the supply chain, support organizations to collaborate more on early and late procurement processes (planning, design, use, maintenance), and promote an open, honest, and trustworthy environment for transactions. Since dishonesty in the supply chain is a fundamental impediment in interorganizational relations, bringing buyers and suppliers together helps build a trustworthy environment where the problems are discussed and integrative solutions are found.

Whereas commerce services can indeed create important efficiencies in the supply chain, the major value would come from collaboration. Since large buyers are expected to lead the way, Zeus focuses on large buyers toward promoting their collaborative services. The idea is to convince companies that they need to work together to improve their supply chains and gain value from online B2B exchanges. There is an issue of gaining a critical momentum to prove the

benefits of collaboration. The initiative toward greater buyer-supplier collaboration is a supply management issue that requires change in management practices, and it also requires a top-down approach from top executives. Moreover, Zeus also expects bottom-up approaches by innovative engineers and designers that understand the benefits of joint design and act as leaders in promoting collaboration.

c. Technology Cost Reduction

Whereas most IT-enabled procurement services provide several benefits (cost and time reduction, efficiency, etc.), they are accompanied with substantial investment costs, especially at the initial stages. For a single organization, an effort to invest in a comprehensive set of procurement solutions will probably be prohibitively high. Zeus delivers procurement value by avoiding these costs for enterprises by evaluating and selecting best quality software and tools, promoting standards in their B2B exchange, and adopting the best technologies available.

Zeus essentially evaluates many service offerings from different software vendors and service providers, and then chooses and proposes the best ones to its exchange participants. Therefore, organizations save on technology evaluation costs by not having to review criteria and individually assess their internal and external needs. Moreover, by utilizing positive network externalities, the initial cost for purchasing IT-enabled services gets distributed across many organizations, thus reducing the per-enterprise costs. Finally, standardized technologies prevent incompatibility issues and allow organizations to coordinate more effectively. Zeus meets regularly with an Advisory Board with executives from its participating companies in an attempt to evaluate solutions and push toward standards. This interactive technique also extends to user councils where actual users meet and discuss several tools. These attempts facilitate standards adoption, build a trustworthy environment, and result in considerable efficiency and connectivity gains.

Zeus aims to become a best-of-breed aggregator of technologies and services for the entire procurement process. Selecting best technologies applies both to the entire marketplace and also to satisfy the needs of small groups of companies (supply webs), and even individual organizations. Zeus has an active role in promoting standards and in the adoption of RosettaNet since it is critical for B2B exchange organizations to become catalysts in the adoption of standardized technologies. Zeus is trying to input more energy in the RosettaNet initiative since there may not be enough momentum. Zeus is trying to educate companies about RosettaNet, promote integrative solutions similar to their ERP systems, encourage standardization in its marketplace, and essentially become an end-to-end test of RosettaNet.

d. Technology Innovation Adoption

A primary impediment to the success of B2B exchanges is the inertia that companies show toward change and resistance to adoption of technology innovations. Zeus expects large companies to become leaders in promoting positive change and actively demonstrate how the procurement process can improve by providing IT-enabled services. Zeus has a Forum where

innovative people (usually from large corporations) have the ability to express their opinions and suggest ways to overcome technology adoption. Zeus also hosts another Forum that brings together buyers and suppliers and encourages 'out-of-the-box' thinking in order to suggest enhancements in the supply chain. The objective of these two Forums is to find collaborative solutions for mutual gains in the supply chain and promote technology innovation adoption. Zeus believes that there is a bell-shaped curve that represents the potential value realization from B2B exchanges, and the current state of today's B2B e-commerce is only in the beginning of the bell's curve, far from its potential peak.

Insights from Zeus

Zeus illustrates a successful combination of collaborative and commerce services around most procurement processes both for public (many-to-many) and private (one-to-many and one-to-one) exchange types. The idea of combining both exchange types within the same B2B exchange arises from the fact that most of the proposed procurement processes and their corresponding procurement services are similar irrespective of transaction type. Therefore, by providing a comprehensive set of commerce and collaborative services, B2B exchange organizations can provide a cost-effective way to enhance procurement. Rather than having to use distinct services and technology platforms depending upon the type of procurement need, this integration allows buyers to enjoy the benefits of a comprehensive set of services in a single B2B exchange at a lower cost. Therefore, the ability to utilize all services under the same technology platform and management is a cost-effective way to enjoy the value-added of procurement services without incurring substantial infrastructure costs, creating economies of scope and scale.

Enterprises often engage in both complex procurement and spot transactions depending on their specific procurement needs. For example, commodities have been associated with spot transactions, whereas complex transaction-specific assets are related to collaborative exchange relationships. By providing both collaborative and commerce services, buyers have the ability to increase the amount of collaboration for spot transactions; similarly, they can allow for more competition in their existing supplier relationships by utilizing some of the benefits of commerce services (e.g. identification of new suppliers, negotiation tools). By combining both types of services, buyers can appropriately vary the amount of collaboration and competition into their buyer-supplier relationships. Moreover, they can utilize the benefits of both collaborative and commerce services to maximize procurement value. For example, the value of planning services can reach new levels through collaborative services that bring together buyers and suppliers that jointly plan the procurement needs based on each others' inventory and production levels.

In addition, Zeus recognizes economies of scope/synergy that can be achieved by combining buying and selling services. Procurement B2B exchange organizations could allow participating enterprises to conduct both their procurement and also their selling activities within a single B2B exchange. This convention could help organizations take advantage of similar IT-enabled services and technology infrastructure for both trade activities. For example, a supplier would receive much value by being able to procure its basic raw materials within the same exchange it uses to sell its finished products. Economies of scope and synergy would give suppliers additional incentives to participate in procurement B2B exchanges since they could use similar

services and technology to satisfy their procurement needs. Another example of economies of scope is the issue of technology cost reduction by allowing suppliers to connect to multiple private procurement exchanges around individual large buyers within the same B2B exchange. Since suppliers have a tremendous infrastructure expenditure of trying to connect to multiple buyers, Zeus provides economies of scope by reducing these connectivity costs.

While some organizations prefer to invest in their own proprietary technology solutions for their supply chain (e.g. Dell), about 80% of the high-tech industry depends on their unique products to gain a competitive advantage. Zeus focuses on the latter group that needs cost effective and efficient ways to improve their procurement process. This group takes advantage of positive network externalities by sharing solutions that their initial cost is spread among many organizations. In sum, there are economies of synergy by combining collaborative and commerce services since their joint outcome could become much greater than the sum of both in isolation.

Insight #1: A B2B exchange organization can create economies of scale, scope, and synergy in combining several collaborative and commerce services around the procurement process. Moreover, it creates positive network externalities by allowing many enterprises to share similar IT-enabled services and share their initial cost, providing a cost-effective way to improve the procurement process.

Collaborative services are effective only if both buyers and suppliers decide to engage in collaborative supply chain relationships for mutual gain. However, the decision to collaborate does not come solely from the fact that collaborative services are technologically advanced and have the potential to create value. A major issue is to convince top management that interorganizational collaboration is beneficial in order to take steps toward utilizing the power of collaborative services (top-down approach). A similar issue is to persuade designers, engineers, and purchasing managers to cooperate with each other by employing collaborative tools (bottom-up approach). Therefore, multiple levels of an organization need to appreciate the benefits of collaboration before the value of collaborative services can be observed. Zeus's difficulty is to demonstrate the benefits of collaborative services in view of enterprises that are reluctant to collaborate. Zeus has recognized the importance of encouraging collaboration by promoting an open, honest, and trustworthy environment. Therefore, before investing in additional collaborative services, Zeus aims to convince its large participants to start employing their collaborative design services by targeting their top executives.

Zeus recognizes a tremendous need to build trust between exchange parties for basic transactions and how to build trust in high-level collaboration (e.g. design, planning). Converge could promote interdependencies by making sure that its IT-enabled services help both parties and create interdependencies among parties. For example, for companies to realize value, they must do so by investing in long-term collaborative services. In a sense, by establishing a network of interdependent parties that value can only be extracted through collaboration, Converge could facilitate collaborative relations. Another approach could be to extend the time horizon so companies have an indefinite horizon in front of them. Successful private exchanges should maintain that the level of trust among trading partners is roughly equal. If there is a low level of

trust, contractual transactions are sought. If there is a high level of trust, a collaborative relationship is sought. However, if there are differences, there is a great danger of opportunism and taking advantage of the high trust parties. Therefore, B2B exchange organizations must first build interorganizational trust before being able to build a collaborative environment where organizations can take full advantage of their collaborative services.

While Zeus aims to create value by creating a knowledge repository, one problem the company faces is the great amount of space required to store all transaction-specific information, especially for collaborative relationships that a great amount of information is shared. Information repository services must account for the excessive amount of information involved, especially for collaborative relationships.

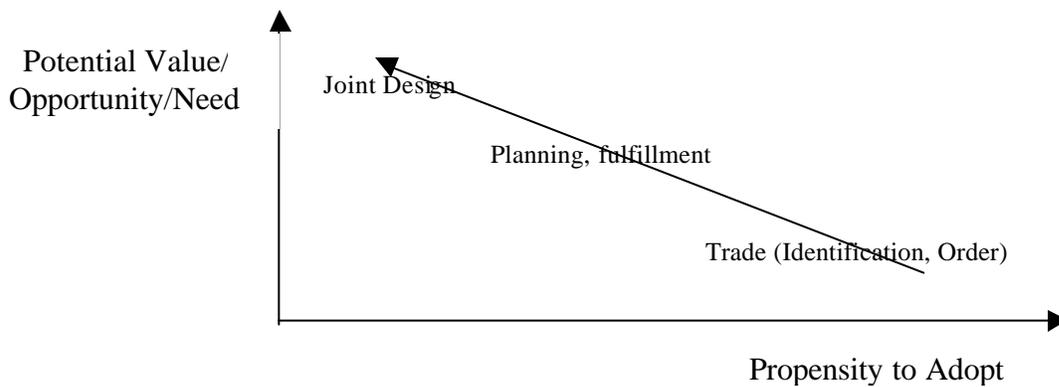
While Zeus recognizes the need for radical improvements in the procurement process toward increased collaboration, the company also appreciates that companies are hesitant to accept radical changes in their procurement behavior and adopt collaborative services. By encouraging enterprise Forums where innovative ideas can emerge, Zeus attempts to build a climate where collaborative IT-enabled services are appreciated and requested. As with most impediments to technology adoption and changes in procurement behavior, B2B exchange organizations need to promote ways to encourage enterprises to embrace and utilize their collaborative services.

Insight #2a: The successful deployment of collaborative services requires not only sophisticated technology, but also a prominent level of interorganizational coordination between buyers and suppliers and intra-organizational involvement at the professional and managerial level. B2B exchange organizations need to encourage greater buyer-supplier coordination to take full advantage of their collaborative services compared to their commerce solutions.

Zeus recognizes the importance to focus not only on the processes where there is great potential value from IT-enabled services, but on the process where service adoption is likely to be high. For example, the focus on trade is not because the potential value is very high, but because organizations are more likely to adopt IT-enabled services around this widely accepted process. The goal is to incorporate collaborative planning and fulfillment services in the next step, whereas design services will then follow. Currently, design services are not yet fully implemented. The objective is to move to collaborative services by starting with the basic procurement solutions and gradually introduce organizations to a collaborative mode. Zeus's plan is to start with procurement and promote collaboration through its trade services. The spectrum of services can be graphically illustrated on a two-dimensional diagram where one axis represents the potential for value, procurement need, or opportunity. The second axis represents propensity to adopt. Commerce services exhibit high propensity for adoption, while the potential value is not enormous. On the other end, collaborative design services show great promise for procurement value; yet, the organizational propensity to accept is low. In the middle, planning and fulfillment services provide medium levels of potential value and propensity to adopt. Following this illustration, Zeus works its way implementing trade services, continuing with

planning and fulfillment services, and aiming to introduce joint design services when companies become accustomed to collaboration. Figure 6 graphically shows this direction.

Figure 6. The Trade-off between potential value and propensity to adopt



Insight #2b: The successful deployment of collaborative services may require to be preceded by gradually increasing levels of shared trade services. B2B exchange organizations need to gradually encourage greater interorganizational collaboration by promoting trade services that require increasing levels of coordination and

Three important elements associated with IT-enabled procurement services are their quality, cost, and interorganizational compatibility. Zeus tackles these issues by acting as a best-of-breed aggregator of the best features and services available. This assures that best technologies are selected, without having individual buyers purchasing their own services. Moreover, by allocating the technology costs to the entire network of participating enterprises, there are positive network externalities where enterprises do not have to incur individual technology purchases. Finally, since the entire network of enterprises in the marketplace shares similar IT-enabled services, the compatibility issue is not a major obstacle for buyer-supplier relationships. A B2B exchange organization such as Zeus is well positioned to serve the electronic components industry by selecting standardized and cost-effective procurement services. Therefore, B2B exchanges can provide substantial benefits by providing services across the entire procurement process since they have the benefit of selecting high quality, affordable, and standardized IT-enabled solutions.

Whereas B2B exchanges have advantages by acting as best-of-breed aggregators, there is an inherent compatibility barrier when dealing with multiple business processes and constant addition of new IT-enabled services. Most services need to be compatible since they often need to communicate along the procurement process; hence, these services must adhere to industry-specific standards such as the RosettaNet standards. Therefore, B2B exchange organizations that aim to provide a great depth of IT-enabled services across the entire procurement process must pay particular attention to select best-of-breed services that adhere to industry standards. Zeus

integrates all its different services and makes sure that they seamlessly connect and integrate to each other. There are synergies in visibility across the procurement process by knowing what each process does in real-time, and by being able to execute by having all information from all different processes.

Insight #3: B2B exchange organizations that provide services around a broad part of the procurement process will need to integrate best-of-breed technologies while adhering to industry-specific standards.

Interpretive Case #2: Agribuys⁴

Agribuys (www.agribuys.com) is a privately owned, independent B2B exchange organization for the food industry. Agribuys offers full service solutions for demand planning, transactions, logistics, receiving, and payment for buyers and suppliers of produce, seafood, meat, dairy, poultry, and ingredients. The California-based organization positions itself as a supply chain integrator that improves the way buyer enterprises carry out transactions, use information to make decisions, and develop relationships with their supply chain partners. Founded in 1999, Agribuys is expanding to further broaden its procurement services to the global food industry.

Agribuys provides services around several parts of the procurement process with emphasis on the fulfillment and planning processes. The organization attempts to identify inefficiencies in each section of the procurement process and offer services to overcome this ineffectiveness. For example, Agribuys observed that misunderstanding during negotiation often hurt buyer-supplier relationships. By providing services to facilitate that all negotiations are documented over the company's system, an automatic record is created that eliminates misunderstandings. In addition, another inefficiency in the procurement process is the large number of errors when entering orders. Agribuys provides services that eliminate redundant entry to increase efficiency, avoid mistakes, and prevent costs. In sum, this B2B exchange organization has scrutinized the procurement process for the food industry and identified a series of common inefficiencies. The company has attempted to create an expertise in these problematic areas and provide services to overcome them.

One major obstacle that Agribuys faces is the difficulty to attract buyers and suppliers and convince them to participate in its exchange and use its services. Many participants in the food industry are reluctant to utilize IT-enabled services to improve their existing procurement practices. The first step in the exchange organization's plan to attract new clients is to employ expert salespeople that aim to identify flaws in each potential client's procurement process and suggest how Agribuys services can overcome them. By assuming the role of a consultant, Agribuys attempts to convince buyers and suppliers to use its services by identifying inefficiencies and suggesting plans to improve existing procurement practices.

⁴ The case-study is based on interviews with executives and managers, and other publicly-available information (e.g. websites, trade publications, press releases, etc.)

Agribuys aims to provide customized services to each buyer's procurement process. Following the initial attempt to create a superficial blueprint for a buyer's inefficiencies and ways to overcome them, the company works with buyers to specifically propose customized solutions. While many of their service offerings can be standardized across all buyers, many services create much greater value by being aligned to the organization's specific needs. For example, Agribuys "myRFQ" service (<https://www.agribuys.com/Agribuys9/Tour/myRFQ.cfm>) allows buyers to eliminate redundant entry by creating a customized template for frequently ordered products.

In terms of proposing radical changes to the procurement process, Agribuys is hesitant to attempt such an endeavor. Facing tremendous resistance from its clients to utilize its IT-enabled services, the most Agribuys does is to build its service offerings around the existing procurement process in the food industry. Therefore, this B2B exchange organization attempts to provide services that do not change the way procurement has been traditionally done, gradually suggesting incremental changes without radical propositions. Consequently, Agribuys offers limited services around procurement business process redesign.

Agribuys faces a serious challenge in terms of evaluating and pricing its services. First, it is not easy to measure how much a particular service has improved the procurement process. Moreover, it may take some time before procurement value from its services becomes materialized in its clients' financial statements. Most important, even if a service evaluation could be adequately accomplished, it would still be difficult to price these services because it is unclear how much companies would be willing to invest in IT-enabled solutions. Therefore, similar to many B2B exchange organizations, Agribuys strives to find ways to accurately price its IT-enabled services.

Insights from Agribuys

Agribuys aims to create value by identifying inefficiencies in specific parts of the procurement process and offering IT-enabled services to improve these glitches. By mapping and scrutinizing the procurement process specifically for the food industry, it is possible to find opportunities that may not exist in a generalized, non-industry context. Whereas the proposed procurement process model applies to all industries, several sub-processes may be more or less important depending on the vertical market. For instance, several departments within the same buyer enterprise perform procurement in the food industry. Agribuys recognizes this industry-specific idiosyncrasy and provides services to encourage learning and sharing of best practices across all different departments and business units. Agribuys has attempted to create an expertise in many industry-specific problematic areas by mapping the procurement process of several buyers and finding generalizable obstacles to provide services to overcome them.

Insight #4: It is useful for B2B exchange organizations to map the different procurement sub-processes that are specific to the industry context to capture opportunities for improvement by providing IT-enabled services around them.

Agribuys analyzes the procurement process of each buyer enterprise individually and suggests personalized solutions. Moreover, this analysis can take place at the industry level by identifying recurrent inefficiencies that are typical to most enterprises. While much inefficiency can be overcome by Agribuys' existing services, there are often cases where customized services are more effective. Therefore, reduction in a buyer's entropy from inefficient procurement processes can be implemented (a) by personalized analysis of the business sub-processes and customized IT-enabled services around them, and (b) standardized services that are recurrent to the specific industry.

Insight #5: The design of services around the procurement process can be triggered by analyzing the inefficiencies in the buyers' business process and providing services that can overcome them. This analysis can take place both at the industry level and also at the enterprise level.

Similar to Agribuys in the food industry, Zeus initially started with a concept to help the entire high-tech industry by providing standardized services for the industry's general and most important needs. However, Zeus has recently moved toward services that are directed toward specific large companies. Large buyers that have the financial capability to invest in IT-enabled services prefer to purchase solutions that are customized to their specific needs. Enterprises often want to differentiate from their competitors by getting customized solutions; therefore, they greatly value customized services that help them maintain a competitive advantage and they are more likely to invest in them. Zeus aims to address specific problems or opportunities in each buyer's supply chain and work with that enterprise to create a customized solution. Usually large companies are willing to lead investing in services, and smaller ones tend to follow.

While there is a great need to remove inefficiencies from the procurement process, there is also a great promise by unleashing the potential that is spread throughout the buyers' enterprise, along the supply chain, and among trading partners. Agribuys aims to unlock this potential by providing IT-enabled services that allow information flow among all trading partners throughout the entire procurement process. According to Agribuys CEO, there are two levels of information that need to be integrated. One deals with strategic information about the big picture of how a company's business processes flow together. The second level deals with detailed information about specific processes. Since several parties in the supply chain share different information pieces, there is a great potential from integrating this cumulative knowledge. The B2B exchange can help enterprises integrate and effectively utilize the knowledge residing at multiple levels and parties throughout the supply chain. Therefore, the role of a B2B exchange organization is to help buyers integrate the unused potential that resides across their supply chain and help them transform it into a useful form of energy that can improve the procurement process.

Insight #6: A B2B exchange organization can design its IT-enabled services to help buyer organizations take advantage of the energy potential spread across their supply chain. By helping buyers integrate the unexploited potential that resides throughout the supply chain and transform it into a useful form of energy, B2B exchanges can dramatically improve the procurement process.

Interpretive Case #3: Apollo⁵

Apollo is a Web-based procurement exchange organization that offers e-procurement software and services tailored for the public sector, specifically for education and government institutions. The Houston-based organization serves public-sector buyers for products ranging from stationery items to computers and landscaping supplies. Apollo has teamed up with retailers to offer their products and services. Apollo offers a marketplace where public administrators can find many of the supplies they need, compare prices, and order products. Apollo's services include supplier recruitment, content management, contract and catalog loading, and strategic sourcing in the areas of technology, food service, and transportation. Apollo enables school districts and government agencies to rapidly deploy e-procurement and streamline all purchasing activities from requesting quotes and searching a database of public sector contracts and catalogs, to requisitioning, purchasing and reporting. This B2B exchange organization aims to speed the delivery of purchasing goods, save buyers time and effort, and help them reduce procurement costs. Apollo's revenues come from transaction fees that suppliers pay to transact with public sector buyers, such as cities, states, counties, and educational institutions. These buyers reimburse Apollo for set-up costs and software services.

Insights from Apollo

Apollo's main strength is to create a market 'niche' for better servicing public sector buyers by knowing the 'big rules' around the public sector, comprehend the procurement processes related to public agencies, and be familiar with their trading behavior in e-commerce. This business-to-government (B2G) exchange organization offers an aggregation service in the public sector by providing shareable contracts with many public agencies. This aggregation service increases the buyers' bargaining power and allows them to negotiate better contracts. Apollo provides identification services through its product catalog that includes indirect and direct materials, MRO goods, and some vertical and complex goods. Negotiation services include electronic quoting, RFQ, sealed bidding, and electronic requisition, while fulfillment solutions comprise of recording services, performance management reports, and product tracking.

While Apollo's exchange shares most characteristics that other B2B exchanges present, governmental laws that require a different scope of transaction history to be kept shape Apollo's procurement context. For example, some institutions require that all interactions around a procurement transaction be thoroughly tracked, whereas others have informal, decentralized purchasing processes and are only interested in the outcome. Therefore, similar to B2B exchanges in specialized vertical markets, B2G exchange organizations have to cope with governmental procurement idiosyncrasies.

⁵ The name of the company is disguised for anonymity. The case-study is based on interviews with executives and managers, and other publicly-available information (e.g. websites, trade publications, press releases, etc.).

Insight #7: Business-to-Government (B2G) exchanges have most of the problems and opportunities that B2B exchange organizations do. However, B2G exchange organizations also operate in an environment complicated by governmental laws that often requires extensive tracking of all interactions around procurement transactions.

Apollo aims to successfully integrate IT-enabled services with business processes to create procurement value. Customization is often required to handle the flow of requisition to support the unique hierarchy of the institution and support the idiosyncrasies of its fulfillment process. Some organizations have a complicated hierarchy, while some others have a simple approval process. Hence, Apollo often needs to customize its IT-enabled services for the hierarchy of each organization.

Furthermore, another issue the B2G exchanges faces is how to deal with differences between a buyer organization's formal management and individual users. While the management prefers structured, standardized, and simple services to avoid organizational complexity, users prefer to have unstructured, non-standardized, and complicated interfaces. There is also a trade off in the cost of training since standard interfaces require little training and have higher user-adoption, while customized interfaces require high training costs. Therefore, Apollo faces a dilemma between flexible, preference-based services with high user adoption, and standardized, ordered services that users find slower to adopt. Therefore, customizing IT-enabled services is not only a matter of additional cost, but also a discrepancy at different levels within its participating organizations.

Insight #8: Customizing the services and interfaces around the procurement process for different buyer organizations accelerates user learning and adoption, but it also requires more resources on providing flexible, preference-based functionality. Customization poses a trade-off between flexibility and standardization, and a dilemma for B2B exchange organizations between satisfying management and user requests.

Procurement for complex products often requires a lot of effort in articulating product description and facilitating buyer and supplier communication. For complex products there are many communication processes, and the B2B exchange organization acts as a filter and translator, helping in describing and communicating product-specific data. In addition, product descriptions and the degree of description detail also vary from context to context. Therefore, a critical problem in procurement exchange organizations lies around answering requests and questions, especially when there is lack of standardization. Apollo's rule is that "Exception is the Rule." Very few transactions happen without exceptions and anomalies and the industry is far from standardization, especially since legislative bodies hold up such efforts. Apollo expects customization efforts and communication support to continue for a while.

Insight #9: Exception is the rule! B2B exchange organizations tend to underestimate the extent of exceptions that occur in the procurement process which require extensive customization and repeated communication between buyers and suppliers. Sufficient resources such as call centers must be facilitated to handle communication and translation issues in the procurement process.

Interpretive Case #4: Minerva⁶

Minerva is a B2B exchange organization that provides an open technology platform that enables the delivery of IT-enabled services for the architecture, engineering, construction, and building industry. The Memphis-based organization provides services that help buyers and suppliers to conduct and manage their procurement business processes, collaborate and communicate seamlessly, and capture and leverage interorganizational knowledge. Minerva aims to deliver integrated services to reduce financial and legal risk, improve profitability, and create accountability and predictability across global projects.

Minerva provides services that facilitate rapid communication and collaboration throughout the entire project lifecycle, from financing and planning through engineering and design, procurement, construction, and facility management. The company provides solutions for (a) collaborative project management, (b) collaborative commerce, and (c) print and financial services. Print services help expediting and managing the process of printing project-related documents, such as plans, drawings, and specifications; financial services help lenders collaborate with borrowers and vendors in the analyzing, sourcing, underwriting, and closing commercial real estate loans. Collaborative commerce services mainly assist the identification and selection processes by allowing interorganizational collaboration for the procurement of complex products and services. However, Minerva's current focus is on collaborative project management services, which primarily assist the fulfillment process that is an integral and time-consuming part of the construction industry.

a. Collaborative Vs Commerce Services

Minerva focuses primarily on collaborative services, as opposed to basic commerce services because of constraints on resource allocation. Since the company had room for limited investments in new services, they had to choose between collaborative and commerce services. Collaborative services based on subscription had been around for several years, and they started to create revenue. Therefore, most of Minerva's resources were allocated to collaborative services because of inability to finance development and support for commerce services that would require a long-time horizon for developing new products. In today's economy, investors do not encourage long-term expenditures on new ideas because the industry is slow, there is skepticism of Internet investments, and the capital markets are extremely tight. Minerva is now focusing on certain parts of the procurement process such as services for collaborative project management.

Minerva's original goal was to seamlessly combine collaborative and commerce services into an integrated technology platform. For example, when a buyer solicits bids, it needs both market information and project-specific specifications for complex projects; therefore, collaborative and commerce services could be integrated, and Minerva could raise revenues by either subscriptions or transaction fees. The initial hope was that participating companies could have the ability to seamlessly use both collaborative and competitive bids for procurement. Minerva had some

⁶ The name of the company is disguised for anonymity. The case-study is based on interviews with executives and managers, and other publicly-available information (e.g. websites, trade publications, press releases, etc.).

degree of integration between its commerce and collaborative services, and there is potential for value to be gained by combining collaborative and commerce solutions.

Resource scarcity has also been observed at Zeus, yet at a lower degree. Similar to Minerva, Zeus also recognizes the danger of doing too many things (provide too many IT-enabled services around many procurement processes) since there is a great cost and effort involved. There is a general concern as to how deep a B2B exchange organization should go - focusing on a single process where there is optimum trade-off between potential for value and propensity to adopt. There is a great cost in attempting to provide, manage, and maintain many IT-enabled services and technology solutions, and B2B exchange organizations must decide their individual focus and trade-offs.

Minerva currently focuses primarily on collaborative project management (collaborative procurement management process), which is a relatively narrow part of the entire procurement process. The company's rationale is to provide superior services to a particular process that have the capacity, expertise, and sophistication to generate value, avoiding the risk of providing too many and potentially incomplete services around too many processes. Minerva's basic idea is to do provide methodical and thorough services on particular processes, and avoid delivering too many imperfect services. Nevertheless, the B2B exchange organization appreciates the need to cover the entire procurement process to create much greater value. After completing some services really well, the goal is move to new services since if a B2B exchange organization does something really well, its customers will demand services around other processes.

b. Incremental Vs Radical Changes

Whereas procurement may require several radical changes, not many enterprises are willing to invest and experiment with new technologies to fundamentally change their procurement processes. Minerva faces a great resistance and reluctance from its participating enterprises to invest in technology changes, especially with today's tight capital spending. Moreover, Minerva has limited resources for new product development; hence, its IT-enabled services are incremental as opposed to radical. Finally, there is a history of failure of proposing radical solutions such as the global marketplace concept, which was new to the construction industry and did not seem to work in the end. Therefore, Minerva attempts to deliver incremental changes to the procurement process following its clients' requests.

The decision to offer incremental or radical solutions does not depend solely on the B2B exchange. Much depends on the large companies to request incremental or radical solutions, not so much of the B2B exchange's willingness to provide such services. Usually large companies have the luxury to experiment on new technologies, and they also have the resources to invest in customized technologies and services. For example, Minerva offers its services to GS Corporation, and Minerva mainly focuses on satisfying GS's requests as opposed to proposing its own inclinations. Consequently, the decision to provide incremental versus radical changes to the procurement process does not solely depend on the B2B exchange, but rather on the participating companies to purchase and adopt radical solutions.

c. Customizable Vs Standardized Services

Minerva believes that it is important for companies to receive customized services, and it offers customizable solution along two dimensions. First, in simple customization, companies receive special customized fields with their company logo, letterhead, and other tailored solutions. This level of customization is easy to implement and it is offered at almost all of Minerva's clients. The second dimension is complex customization that requires integration with existing infrastructure systems (customized technology platform services). While Minerva is able to provide a certain degree of customized technology infrastructure integration services, the company focuses on few large customers that have the resources to implement such endeavors. Therefore, customized services that facilitate technology integration of Minerva's collaborative services with the clients' infrastructures are primarily provided to large enterprises.

d. Procurement Value from IT-enabled Services

Minerva strongly believes that services around the procurement process are worthwhile, even if today not too many companies recognize their value. This section discusses some reasons that Minerva did not create the initially anticipated high levels of procurement value, and suggests ways to increase value realization.

One of the major reasons that many B2B exchanges failed to realize procurement value is lack of resources for software development. Many B2B exchange organizations, including Minerva, rushed to offer their services even if they did not have a complete solution because of inadequately developed software products. By providing incomplete and often imperfect services, both buyers and sellers could not capture much value and eventually faced losses from their investment in these IT-enabled services. Since enterprises were not able to receive the value they were promised or expected, they essentially abandoned many B2B exchanges and their services. Software development is a slow activity that usually takes more time, resources, and effort than initially anticipated, especially if there are many implications that are not ex ante accounted for. In addition, many business managers usually do not have enough knowledge on system design to be able to appreciate and evaluate the time and resources needed for software development. This drawback occasionally resulted in delays, missed deadlines, and inadequate products that were proven to be costly for Minerva since it lost a number of its participating enterprises because of these factors.

Minerva recognized that providing fulfillment services could create substantial procurement value. Integrating procurement with back-end inventory systems such as delivery, tracking, returns, and backorders could be valuable to the construction industry. It is important for buyers to know when things are delivered to a project, and since this service was never offered, buyers never really realized value after the ordering process. Much of this limitation was due to the fact that the technology to support fulfillment services was never developed to a degree that it could be delivered and successfully implemented. Minerva's goal is to concentrate on meeting deadlines, make sure that product releases are on time, and effectively satisfy customer requests.

Another reason for not creating enough procurement value is because B2B exchanges underestimated the need to concurrently create value to the supplier side (Mehra 2000). By focusing predominantly on how to assist buyers, even at the supplier's expense, many suppliers realized that participating in such exchanges would hurt them. Hence, many suppliers decided not to participate in these B2B exchanges and concurrently influenced many of their partners. The reality is that there is a substantial supplier influence on procurement, and by focusing only on benefits to the buyer side, B2B exchanges missed the opportunity to create mutually beneficial solutions. IT-enabled services can create value to both buyers and suppliers, and focusing on only on procurement hurt many B2B exchange organizations. Therefore, exchange organizations need to find the right balance between value-added services for both buyers and suppliers; even if a B2B exchange favors procurement, it needs to ascertain that the supplier side is at least better off with the introduction of the exchange's services.

Insights from Minerva

Despite the inability to meet the initial expectations for an integrated solution with collaborative and commerce services for the procurement process, Minerva is generally successful in terms of the quality of its IT-enabled services. Moreover, in terms of its collaborative services, Minerva has been successful in attracting large enterprises that have the resources to fully employ and customize its service offerings. Unlike Zeus that has the ability to offer both collaborative and commerce services, Minerva faces a resource constraint that forced it to focus on collaborative project management (collaborative procurement management). Even if Minerva does not offer an integrative solution of both types of support services, there are substantial benefits from excelling in one particular domain. Given resource scarcity, there is substantive value from specializing in particular services as opposed to providing incomplete generalized solutions across the entire procurement process. Since there is a continuous need for improved services around the procurement process, B2B exchange organizations can continue extending their service offerings to cover other procurement needs by gradually developing new services. When selecting a small part of the procurement process to provide services around, it is advantageous to focus on the most important aspect for the industry. For instance, project management is a vital part of the procurement process in the construction industry, and project management services are the industry's "killer application."

Insight #10: For B2B exchanges in resource scarce environments, it is advantageous to focus on a few selective services where core competence is highest and industry need is most critical. Each industry has its own "killer application" services that are likely to receive wide acceptance.

A major issue that arose from Minerva's case study was the importance of providing value to the supplier side, and avoiding creating procurement benefits to the suppliers' expense. Many B2B exchange organizations focused on creating procurement value by essentially squeezing profits from suppliers, while not providing adequate incentives for suppliers to participate in their exchanges. Therefore, B2B exchanges neglected the important impact that suppliers have to

buyers' behavior (Deeter-Schmelz et al. 2001). Zeus also recognized this issue, and it tries to provide IT-enabled services that would create roughly equal value to both buyers and suppliers; if this is not possible, the idea is to avoid making one party better off in the expense of the other party. According to Kambil and Van Heck (1998, p. 16), given "...existing market alternatives, now new IT-based initiative is likely to succeed if any key stakeholder is worse off after the IT-enabled innovation." Since B2B exchanges are essentially IT-based initiatives, they could not succeed by making suppliers worse off. Evidence from several failed B2B exchanges validated the propositions of Kambil and Van Heck (1998). Therefore, the introduction of new IT-enabled services must ensure that value is created for both sides and suppliers have sufficient incentives to participate in B2B exchanges.

Insight #11: The business model of B2B exchange organizations needs to ensure that benefits and value creation is shared across both buyers and suppliers, and neither side becomes worse off after the introduction of new IT-enabled services. Creating procurement value at the expense of the supplier side is not a viable business model since suppliers must receive adequate incentives to participate in B2B exchanges.

While most of the discussion on B2B exchanges has focused on viable economic and commerce models, pricing, strategic, and positioning issues, and other macro-level phenomena, a major issue identified in the Minerva case study was systems development. Since B2B exchange organizations deal with technology-driven services, a fundamental, yet neglected issue is how to effectively handle system analysis and design to provide high-quality technical solutions within cost and time constraints. This finding calls for reconceptualization of B2B exchanges into a technology-oriented issue.

Insight #12: Creating and implementing novel IT-enabled services in the procurement process in a rapidly changing environment typically requires complex software design and systems integration that is subject to time and budget overruns and quality problems. Enterprises need to longitudinally assess the ability of a B2B exchange organization to perpetually deliver high quality services, rather than evaluating snapshot service offerings.

Interpretive Case #5: Cyclone⁷

Cyclone is an online B2B exchange organization for buyers and suppliers of electronic components. Cyclone launched its B2B exchange to provide services to help high-technology industry buyers and suppliers to work faster, easier, and more cost-effectively. It enables buyers to post RFQs and solicit competitive bids from qualified distributors and manufacturers, while all participants can upload their excess inventory. Cyclone attempts to improve the procurement process without requiring buyers and suppliers to change their transaction behavior, but facilitating buyers to continue working with their preferred suppliers and distributors. Unlike Zeus that charges transaction or subscription fees, Cyclone's pricing model is based on hard-to-find components because it is able to opportunistically price rare components and sell them at a great premium. Moreover, it also charges some of its participants a subscription fee for customized tools and services.

Insights from Cyclone

Cyclone focuses on few parts of the procurement process that the electronic components industry faced the most apparent inefficiencies. The first aspect is the identification process that buyers need to locate and purchase components quickly. This B2B exchange organization provides services around the identification process by providing extensive databases with product and supplier information. The second aspect is to help the selection process by providing an open marketplace where buyers can post RFQ, receive bids, and review incoming bids quickly. The final aspect is to help the disposal process by providing inventory management services that help companies dispose their excess inventories at reasonable prices. Therefore, Cyclone focuses only on a few parts of the procurement process where the electronic components industry suffers most. This B2B exchange organization does not aim to radically change how these processes are done, but simply to offer basic services to improve the procurement process by focusing on critical inefficiencies.

Cyclone attracts buyers in its B2B exchange by essentially offering low-cost services around the identification, selection, and disposal process. However, this B2B exchange organization also acts as an intermediary by providing global sourcing services for rare components in shortage situations. By employing a team of professional and experienced professionals, Cyclone helps buyers identify rare components. This specialized identification service is the company's major source of revenue by charging high markups for rare components.

Insight #13: For B2B exchanges in environments with chronic transient shortages, it is advantageous to provide high-margin services around that aspect, while providing a host of discounted services around the other parts of the procurement process to attract and maintain a stable customer base.

⁷ The name of the company is disguised for anonymity. The case-study is based on interviews with executives and managers, and other publicly-available information (e.g. websites, trade publications, press releases, etc.)

Cyclone aims to attract and maintain a stable customer based on its experience in the electronics components industry and its expertise in providing industry-specific services. Since many players in the industry are hesitant to rely on new and unproven technologies for their procurement needs, Cyclone employs several executives with long experience in the electronics industry. These ‘gray-hairs’ give a signal of deep knowledge of the industry and help boost Cyclone’s image as an experienced company. Rather than concentrating on technology-related expertise, this B2B exchange organization builds a reputation for its experienced and knowledgeable executive in the electronics industry.

Insight #14: A B2B exchange attracts and maintains buyers and suppliers based on a reputation of business experience, knowledge, and expertise in the particular market segment it serves. Employing executives with long experience in the industry (‘gray-hairs’) helps boost the B2B exchange organization’s reputation.

Illustrative Case #6: SoluMed⁸

SoluMed (www.solumed.com) is an online B2B organization for the procurement of new, used, refurbished, or surplus medical equipment and related services. The California-based organization provides services to create a dynamic marketplace through a classified advertising database (catalog with posted prices), banner advertisements, and online auctions that accelerates the sales cycle of medical products and services. SoluMed’s customers are mostly hospitals, clinics, physicians, medical equipment manufacturers, dealers, refurbishers and remarketers, and importers & exporters. Both buyers and sellers can benefit from greater efficiencies in the identification process by searching for equipment advertisements, posting auction items, and creating requests for medical equipment requirements and purchases. SoluMed operates on transaction fees based on transactions between medical equipment buyers and sellers throughout the world. Most products exchanged are used, refurbished, or surplus medical equipment with prices ranging from \$2,000 to \$300,000. The exchange attracts participants from around the world, and most suppliers are US-based enterprises, whereas most buyers are located internationally. This B2B exchange organization creates revenues by membership fees and transaction fees collected from buyers by positioning these collection fees as sales proceeds. Since its value is primarily to international buyers from finding suppliers in the United States, most of its transaction-based revenue comes from the procurement side, while sellers pay advertising fees.

Given the nature of used medical equipment, this exchange organization does not offer many services around all parts of the procurement process such as the design and planning processes. This B2B exchange is mainly a transaction-facilitator; hence, no collaboration among market participants is needed or facilitated. Most services deal with providing basic product information and outsourced services for third-party shipping and escrow services. In terms of increasing reciprocity among transacting parties, SoluMed offers a communication platform where buyers

⁸ The case-study is based on interviews with executives and managers, and other publicly-available information (e.g. websites, trade publications, press releases, etc.)

and sellers could anonymously exchange information prior to purchase. In sum, this B2B exchange mainly focuses on the identification and selection processes, creating value by increasing a buyer's and seller's reach and range.

Since most exchange participants are international, there are limited infrastructure integration services provided by SoluMed. Nevertheless, the organization offers some basic technology platform services such as custom website design tools that utilize low cost, high quality international development resources, as well as other website promotional services that are available to organizations that would like to establish a web presence. The major problem arises because many potential clients have limited resources for web interface; hence, SoluMed's essential marketing tool is having potential clients establish a basic Internet connection.

Insights from SoluMed

SoluMed creates value by matching a fragmented market where thousands of buyers and sellers around the world need to communicate, interact, and transact by providing services that reduce inefficiencies in the identification and selection process. The ability to increase the reach of buyers through a centralized marketplace creates substantial improvements in the time and effort required to access and analyze product information. Moreover, the range of products a buyer has access to increases by having multiple sellers posting their products and allowing buyers to post wanted ads. Therefore, buyers are likely to find better products and receive better prices. Given the fragmented nature of the industry, most value can be gained by aggregating information and matching buyers and suppliers.

Insight #15: In highly fragmented markets, most procurement value can be created in the identification and selection process by increasing the buyer's reach to a great number of suppliers and extending the buyer's range to a great number of products.

7. DISCUSSION & IMPLICATIONS FOR ACQUISITION RESEARCH AND PRACTICE

Interorganizational online procurement is rapidly moving from basic transactions toward collaborative buyer-supplier relationships and a comprehensive supply chain management. Similarly, while procurement B2B exchanges were initially introduced as information portals and basic transaction facilitators, they are gradually evolving toward technology platforms with value-added services to support complex procurement and facilitate interorganizational collaboration. According to Raisch (2001), the next step in the evolution of procurement B2B exchanges is the seamless integration of transaction exchanges, value-added services, and knowledge services to create a value trust network to facilitate secure and intensive buyer-supplier collaboration. In fact, the recent trend is toward private exchanges where a small, trustworthy network of buyers and suppliers can engage in confidential information sharing and collaborative relationships. This movement is reinforced by the need for customized IT-enabled services that take in account specific needs in the procurement process.

Several models and levels of analysis have been proposed to understand interorganizational e-procurement (e.g. Davern and Kauffman 2000, Gebauer et al. 1997, Kambil and Van Heck 1997, Nissen 1997). However, these models do not adequately capture the notion of collaboration among buyers and suppliers, which is an important element of successful procurement. According to Hui and Beath (2001), research on procurement has predominantly focused on the buyer side, neglecting the input and influence of the supplier side. Moreover, the importance of IT-enabled value-added services has not been adequately accounted for in the extant procurement research. The proposed business process model for procurement attempts to capture the notion of these changes that e-procurement has brought. First, it captures the notion of collaboration by extending the procurement process model to account for collaborative primary and support processes. In contrast to previous models that focused solely on the basic transaction process, the proposed business process model encompasses processes that support collaborative buyer-supplier relationships. Second, by focusing on the business process as the unit of analysis, the proposed model takes in account the value of IT-enabled services on each part of the procurement process. Figure 3 shows how different IT-enabled services add value to each part of the procurement process. Third, the procurement process model accounts equally for both buyers and suppliers, since both sides can evenly affect each process. The superiority of the proposed model will become more evident when e-procurement becomes more collaborative, more value-added services are introduced, and multiple stakeholders are involved.

The applicability of the proposed process model for procurement became evident during the interpretive case studies. All procurement B2B exchange organizations focus on specific procurement processes and aim to build IT-enabled services to add value to them. By targeting each business process individually, it is possible to identify most inefficiencies and find ways to overcome them. Following Davern and Kauffman (2000), we noted that value creation could arise at various levels (market, firm, work-group, business process, and individual users). However, by viewing each business processes independently, all other levels can be incorporated to find how they interact with the underlying business process. For example, Apollo realized the need for customization at the user level by observing how different individual users dealt with

different parts of the procurement process. Moreover, by focusing on value creation at the procurement process as opposed to the buyer, it is easier to identify how suppliers are part of the process in order to find ways to create value not only for them, but also for the buyer side. Zeus recognized this opportunity, and by focusing on the procurement process, it finds ways to create value for both buyers and suppliers.

Another important finding of this study is the recent focus on customized services for each organization. While B2B exchange organizations initially attempted to introduce low-cost, generalized services that are made for the entire industry, many enterprises prefer to invest in customized solutions that are specifically targeted on their own procurement process. Not only this approach helps enterprises better identify specific inefficiencies and opportunities in their own procurement process, it also helps them build a unique procurement process that can be a source of competitive advantage. According to Peteraf (1993), an advantage can only be sustainable if it cannot be easily imitated. Therefore, by focusing on customized services, organizations aim to effectively utilize procurement B2B exchanges and their IT-enabled services toward creating and sustaining a unique competitive advantage.

This research has recognized the importance of exceptions in the procurement process, especially when dealing with governmental, state, and federal organizations. These exceptions usually occur both at the transaction/instance level and also at the organizational level. While IT-enabled services are designed to add value to a generalized procurement process model, they should simultaneously be able to handle different forms of exceptions. Exceptions at the organizational level can be resolved by customized solutions that aim to address the idiosyncrasies of each enterprise; however, exceptions at the transaction level must often be addressed in real-time at different parts of the procurement process. Apollo deals with the problem of exceptions by providing flexible services that can deal with differences at the instance level. Therefore, flexibility in the IT-enabled services is important to account for transaction-specific exceptions.

Limitations and Suggestions for Future Research

The notion of energy has not been sufficiently examined in procurement research (Chen 1999). The second Law of Thermodynamics states that without an infusion of energy, a system can only be transformed to a state of increased disorder or disorganization (i.e. higher entropy). Applied to the procurement process, a process at some given energy level can only increase its energy level by infusion of work; otherwise, its entropy will increase and inefficiencies will arise. While most research on procurement focused on reducing entropy by increasing the efficiency of the procurement process, this research argues that value-added services can also infuse energy into the process, increasing its overall effectiveness. Collaborative services are crucial ways to infuse energy by allowing buyers and suppliers to infuse work (energy) in the procurement process. Future research should examine how energy can be infused in the procurement process and how different forms of work from several partners can be effectively integrated to improve procurement efforts.

El Sawy and Nissen (1999) identify and define three core structural dimensions of relationship complexity: reach, range, and reciprocity. The dimension of *reach* is proposed to measure the

number of *potential* partners to which an organization has likely access. Whereas reach refers to the *number* of potential partners, range pertains to the variety or *diversity* in core competencies among potential partners. The *reciprocity* dimension measures in aggregate the strength and directionality of the relationship (collaboration) between the organization and the partners within its reach. It is based on trust and interdependence and pertains to the strength or intensity of the relationships with potential partners. These three core structural dimensions of reach, range, and reciprocity characterize the relationship complexity of the organization in its environment. Since these three dimensions do not directly capture to the capacity of the organization for purposeful rapid reconfiguration, El Sawy and Nissen introduced the concept of reconfigurability as a dynamic complement to these three dimensions, which pertains to the organization's capacity and ability to reach, range, and reciprocity. Reconfigurability combines speed, scale, and scope components. For an enterprise to have higher reconfigurability, it must also have higher energy available. Applied to the procurement context, buyer enterprises are likely to increase the amount of energy by effectively utilizing IT-enabled services that can increase their reconfigurability. Future research should examine how procurement B2B exchanges can infuse energy in the procurement process by increasing reconfigurability.

Despite the ability of procurement B2B exchanges to create value, the findings of this research noted that many buyer enterprises do not take full advantage of the potential value provided by B2B exchange organizations. This finding is supported by Chircu and Kauffman (2000) who proposed 'limits to value' in information technology investments and noted that several barriers prevent firms from taking advantage of their investments. Future research should examine several factors that affect the procurement process such as market, organizational, work-group, and individual users that may moderate value realization. By focusing on different factors that influence the procurement process, it is possible to examine where there are barriers to value and what IT-enabled services can be designed to remove this wastefulness. Future research could investigate value realization in the procurement process, and identify ways to improve procurement by reducing inefficiencies and ineffectiveness in the procurement process.

The findings of this exploratory research are based on a small sample size of few relatively successful procurement B2B exchange organizations in selected industries. Therefore, the proposed insights may not be generalizable to all B2B exchanges in all industries. In addition, the input from buyer enterprises has not been adequately examined to understand how buyers perceive their participation in B2B exchanges. The empirical findings do not take in account the supplier side and their influence on the procurement process. Future research should be at a confirmatory stage to validate and expand the findings from this exploratory study on B2B exchange organizations by systematically surveying a large sample of buyer-supplier relationships in several B2B exchanges.

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¹ The term “product” will be used to describe both tangible and intangible goods and services.

² The term "buyers" and "suppliers" will be used to describe buyer and seller organizations, respectively.

³ The term “interorganizational relations” reflects the economics and marketing view of transfer of value (ownership) between two organizations. On the other hand, the term “exchange” reflects a structural view (organizational form) of governing and coordinating transfers of value and interorganizational relations.

⁴ Market liquidity refers to the ability of a product to be converted quickly into cash without any price discount.